

BassStation Rack™

ANALOGUE SYNTHESIZER MODULE

OWNERS MANUAL



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INTRODUCTION

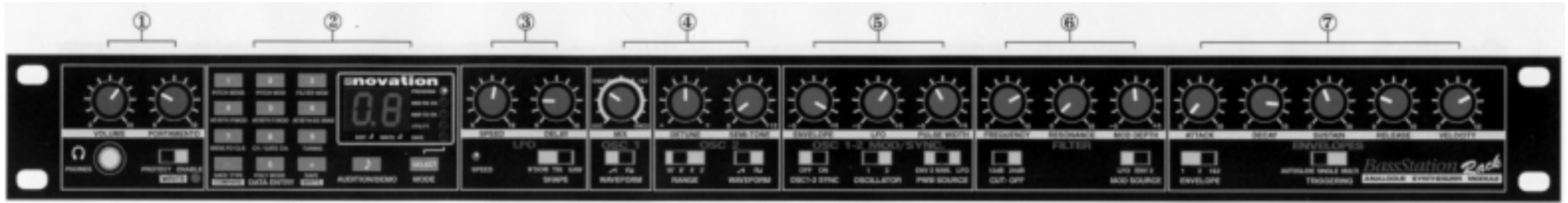
Thank you for buying the Novation BassStation Rack Analogue Bass Synthesizer. The module you have purchased is ideal for producing the kind of bass sounds which have returned to popularity in recent years, but it is capable of far more than just that. Analogue synthesis is also suitable for melody lines and lead solos as well as sound effects.

The MIDI specification on the BassStation Rack allows for real-time transmission and reception of controller information. This means that the live 'tweaking' of controls during a performance, which is particularly appropriate for analogue sounds, can be recorded into a sequencer along with the notes played and the entire performance recreated on playback. Bulk or individual dumps of the 100 Memory locations can also be sent and received, allowing you to build a large library of analogue sounds for different applications.

The BassStation Rack also adds several features over and above the specification of the successful BassStation keyboard. The Oscillator Sync. feature is very popular with traditional synthesists allowing very vocal timbres. The CV! Gate - MIDI converter can be used to trigger the Rack from a vintage analogue synth/sequencer or as a translator for a MIDI sequencer to trigger other analogue devices. The external input to the Rack's filter means that you can process any other instrument - including an analogue synth being triggered by the CV/Gate - MIDI converter

Welcome to an expanded "Analogue for the 90's".

FRONT PANEL



1 Master Volume Section

This section contains the Master Volume and Portamento controls, Headphone output socket and the Program write enable switch.

2 Data Entry I Program Section

This section contains the 12 Data Entry buttons, Display and Menu LEDs, Audition/Demo and Mode Buttons.

3 LFO Section

This section contains the LEO Speed, Depth and Waveform Shape controls.

4 Oscillator 1- 2 Sections

This section contains the Oscillator 1 Waveform, Oscillator 2 Waveform, Range, Detune and Semi-tone transposition controls. It also contains the control to mix

Oscillators 1 & 2 with the external audio input.

5 Oscillator 1 & 2 Mod/Sync Section

This section contains the Oscillator 1-2 Sync, Oscillator Mod select, PWM Source, Envelope Modulation, LEO Modulation and Pulse Width Depth controls.

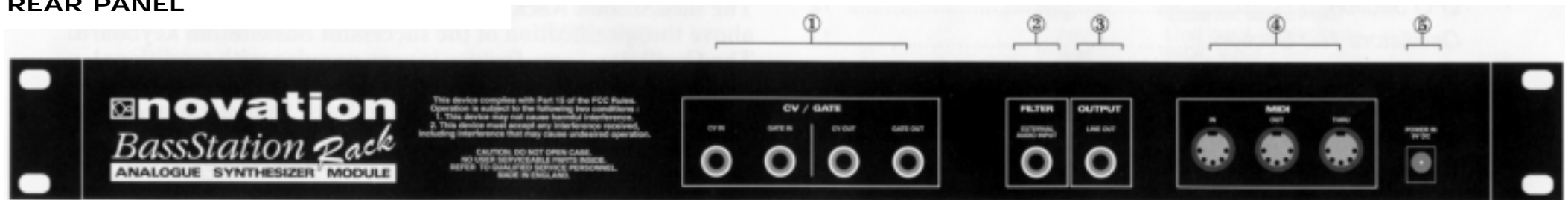
6 Filter Section

This section contains the Frequency, Resonance, Modulation Depth, Cut-off slope and Modulation Source controls.

7 Envelope Section

This section contains the Envelope select, TrIGGERING, Attack, Decay, Sustain, Release and Velocity controls.

REAR PANEL



1 CV / Gate In & Out

The connectors in this section are used to interface vintage analogue synthesisers with CV / Gate in/outs to MIDI.

2 Filter Input

This connector is used to process an external MIDI triggered sound source through the filter and envelope sections of the BassStation Rack.

3 Output

This 1/4 jack delivers a line-level output signal for connection to a mixing desk or amplifier input.

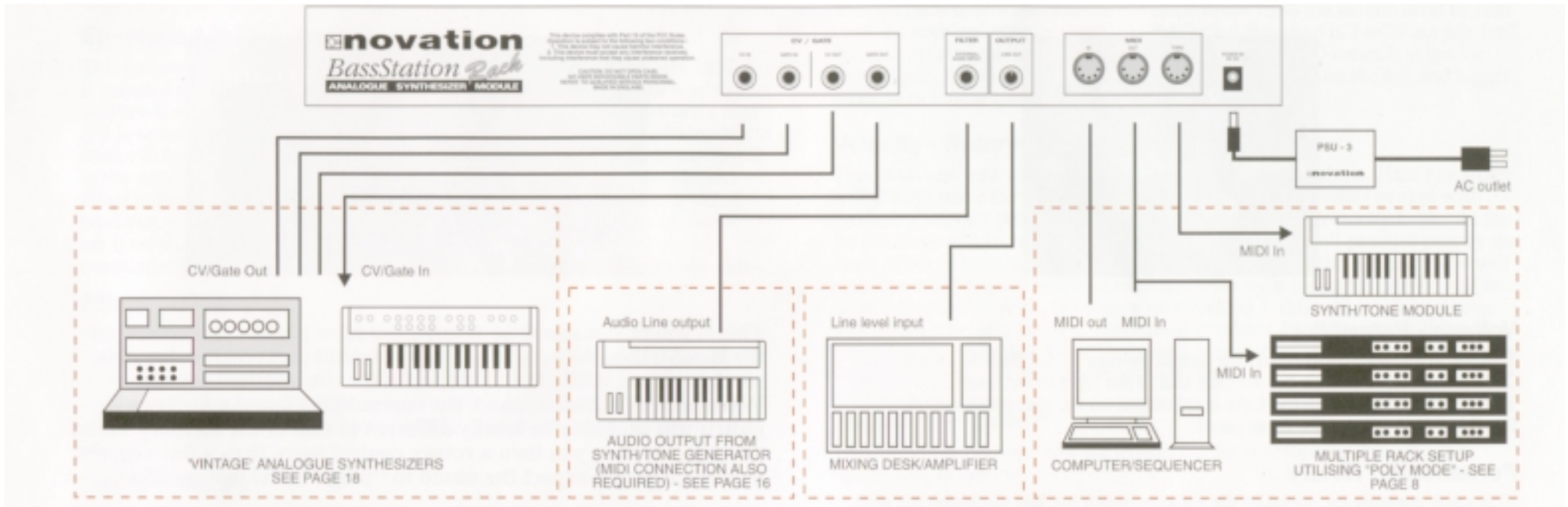
4 MIDI

IN - This connector is used to receive MIDI data from an external device
 OUT - This connector is used to transmit MIDI data to an external device.
 THRU - This connector re-transmits MIDI data received by the MIDI IN socket to an external device.

5 9vDC Input

Connect the output plug of the AC adapter supplied with the BassStation Rack to this socket.

CONNECTIONS



QUICK SETUP GUIDE

Connect the 'Line out' socket on the BassStation Rack to a suitable amplifier or mixing desk and set the 'Volume' control to a reasonably high output level (9-10). This will maintain a good signal to noise ratio on the line level output from the BassStation, but be sure that the input volume setting on your amplifier or mixer is initially set at a low level (to ensure a comfortable listening volume when the first notes are played) and then adjust accordingly. Connect the MIDI Out from your master keyboard or sequencer to the MIDI In on the BassStation Rack and check that the 'Write' switch is in the 'Protect' position. Now, connect the power supply (Novation PSU-3) to the socket marked 'Power In 9VDC' and plug into a suitable AC power outlet.

The Display should now illuminate showing the selected program number and the LFO speed LED should be flashing at a constant rate. If this does not happen, check that the power supply is of the specified type and that it is connected as described above. Now you can use your master keyboard or sequencer to play the currently selected sound (the BassStation Rack is initially set at the factory to receive on MIDI channel 1). To listen to all 40 factory presets, first make sure the 'Program' LED is on (if not,

use the 'Mode' button to re-select) and then use the 'Data Entry' keypad to call up sounds '00' to '39' - see page 5 and the separate sheet for factory program information. You can also use the 'Audition' button to trigger the sounds

The BassStation Rack also features a 'Demo' mode. To play the demo use the 'Mode' button to select 'Utility' (LED lit) and press the 'Audition/Demo' button. To stop the demo, simply press the 'Audition/Demo' button again.

Reading the following chapter, "How the controls work" in detail, will help you to understand how the sounds were created and allow you to explore the extensive sonic capabilities of the BassStation Rack so you can easily create your own, individual sounds.

HOW THE CONTROLS WORK

MASTER VOL SECTION



Volume - Rotary

This knob allows you to adjust the output volume of the BassStation Rack. Turn to the left to reduce the volume and to the right to increase the volume. This control affects both the Line level output on the rear panel and the Headphone output on the front panel.

Portamento - Rotary

This knob controls the speed of the glide between the last pitch and the next. All the way to the left, the pitch changes instantaneously so you will not hear any glide. As you move the knob to the right, the time taken for the pitch to change between notes is increased and you begin to hear the glide. At the far right, this takes 5 seconds. The position of this knob is saved with each sound.

Write - Switch

This switch protects your sounds from accidental erasure. During normal operation it should be left in its 'Protect' position however, when you have edited or created a new sound that you want to save, moving it to the 'Enable' position will allow you to "write" over an existing sound - see "Writing a Program Into Memory" on page 10.

Headphone - Socket

Use this 1/4 jack socket to monitor the output of your BassStation Rack via headphones. This output will drive any type of headphones.

DATA ENTRY / PROGRAM SECTION



This is where you select the sounds you have previously created on the BassStation Rack, set the MIDI transmit and receive channels, set the various utility functions and store newly edited sounds. When editing a stored sound, the current position of a knob or switch will probably be totally different to that of the memory sound selected, so when you turn a rotary control more than a few degrees or move a switch expect the sound to "ping" to the new position.

Mode -Button

This button is used to select which of the five main parameter 'Modes' are accessed by the 'Data Entry' keypad. The current mode is indicated by one of five LED's on the right hand side of the display panel. NOTE: When the BassStation Rack is switched on, 'Program' mode is automatically selected. Each time the Mode button is pressed the next 'Mode' in the menu will be selected i.e. MIDI RX Channel, MIDI TX Channel, Utility and Save. From 'Save', the next press will loop the menu back up to the 'Program mode'.

Audition/Demo - Button

This button is used to trigger a note from the currently selected sound. It provides a convenient way of monitoring a sound whilst working at the control panel. The triggered note can also be transpo-ed up or down to suit the sound (higher notes for lead sounds, lower notes for bass) as follows:

DATA ENTRY / PROGRAM SECTION CONT.

1. Press and hold down the Audition button - note sounds once.
 2. Press the '+' button on the Data Entry' keypad - note sounds once + 1/3 octave. (Each time the '+' button is pressed the note will sound and move up 1/3 octave)
 3. Press the '-' button on the 'Data Entry' keypad - note sounds once - 1/3 octave. (Each time the '-' button is pressed the note will sound and move down 1/3 octave)
- When you are happy with the transposition of the note, release both buttons. To check the note again simply press the 'Audition' button.
 NOTE: The transposition setting is not saved with each sound. For information on the 'DEMO' mode, see page 9.

Data Entry Keypad - Buttons

The 12 buttons of the 'Calculator style' Data Entry keypad are used to call up and set the various operating parameters of each 'Mode' function. You can use two methods to enter a number:

- I. DIGIT INPUT - using the buttons 0 to 9.
 Note: this must always be a two digit entry, for example:
 Selecting program sound 8 press the '0' and '8' buttons - display reads '08'.
 Selecting program sound 47 press the '4' and '7' buttons - display reads '47'.
2. INCREMENT/DECREMENT - using the '-' and '+' buttons.
 Press the '+' button to move up to the next program or value.
 Press the '-' button to move down to the next program or value.
 These buttons can also be used to 'scroll' through values by pressing and holding down until the desired value is reached.

Mode 1-Program Change

This is where you select a sound from the BassStation's 100 programs. The 'Program Change' mode is automatically selected when the BassStation Rack is powered up and the program number displayed will be the one selected prior to power being turned off. To select a different sound. first check that the 'PROGRAM' LED is on. Using the 'Data Entry' keypad as described above, you can quickly call up any of the BassStation's programs. The recognised numbers in this mode are from '00' to '99'. You can also use MIDI Program Change commands from a sequencer or other external MIDI device to call up sounds. NOTE: Because the Rack's programs begin at '00. the next higher number must always be used to call up the correct sound. i.e. to select Rack program 88, transmit a MIDI Program Change 89.
 NOTE 2: The 40 factory sounds are stored in programs 00' to '39' whilst the 60

user locations from '40' to '99' are all initially stored with a basic square wave tone - see separate sheet for program listing.

Mode 2-MIDI Receive Channel

This is where you set the MIDI receive channel for the BassStation Rack. Use the 'Mode' button to select the 'MIDI RX Ch.' mode - LED on, and then the 'Data Entry' keypad to enter your selection. The recognised numbers in this mode are from '01' to '16'.
 NOTE: the 'MIDI RX CH.' LED will flash when MIDI data is received on this channel.

Mode 3-MIDI Transmit Channel

This is where you set the MIDI transmit channel for the BassStation Rack. Use the 'Mode' button to select the 'MIDI TX Ch.' mode - LED on, and then the 'Data Entry' keypad to enter your selection. The recognised numbers in this mode are from '01' to '16'. NOTE: The MIDI Tx and Rx channels are memorized even when the power is turned off.

Mode 4-Utility

This is where you set the various Utility functions of the BassStation Rack. Use the 'Mode' button to select the 'UTILITY' mode - LED on.
 NOTE: the operating system of the 'Data Entry' keypad is slightly different in this mode (all of the functions in the Utility mode are visually indicated by yellow text - see panel diagram). The '0' to '9' buttons are now used to call up sub-directories' of the Utility mode and the '-' and '+' buttons used to change their values whilst the display will flash alternatately between a value and a letter reference code. The ten sub-directories of the Utility mode are as follows:

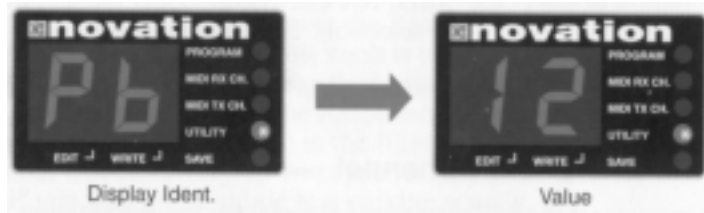
Button	Function	Display Ident.	Range
1	Pitch bend range	P b	'00' to '12'
2	Pitch mod depth	P d	'00' to '15'
3	Filter mod depth	F d	'00' to 15'
4	Aftertouch/Breath pitch mod depth	A P / b P	'-7' to '07'
5	Aftertouch/Breath filter mod depth	A F / b F	'-7' to '07'
6	Aftertouch/Breath envelope generator bias	A E/ b E	'00' to '15'
7	MIDI to LFO clock rate	L F	'00' to '96'
8	CV/Gate MIDI channel/Type	OH/Ct	'01' to '16'/'00' to '02'
9	Tuning	Tn	'-9'to'09'
0	Polyphonic Mode	P L	'OF' & 'On'

HOW THE CONTROLS WORK

DATA ENTRY / PROGRAM SECTION CONT.

Pitch Bend Range

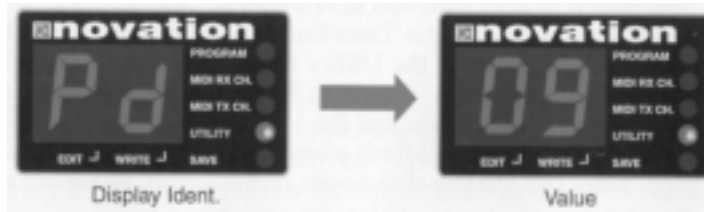
This is where you set the semitone range response by the pitch bend wheel of an external keyboard. Each number represents a semitone i.e. bend range '02' = two semitones. bend range '12' = twelve semitones (one octave). Press the 'PITCH BEND' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound - see 'Writing a program into memory' on page 10.

Pitch Mod Depth

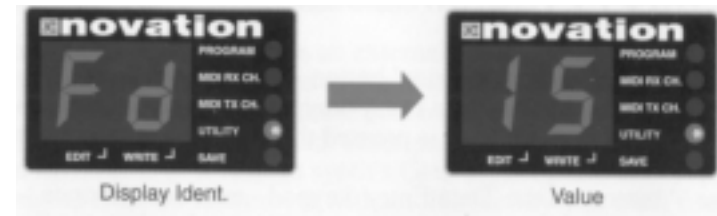
This is where you set the amount (depth) of pitch modulation from the Controller wheel of an external keyboard. Range = '00' (off) to '15' (maximum). Press the 'PITCH MOD' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound - see 'Writing a program into memory' on page 10.

Filter Mod Depth

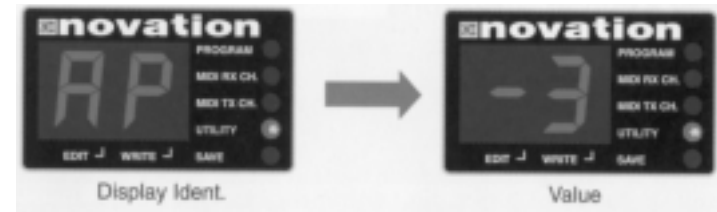
This is where you set the amount of filter modulation from the Controller wheel of an external keyboard. Range = '00' (off) to '15' (maximum). Press the 'FILTER MOD' button once - the display alternates between:



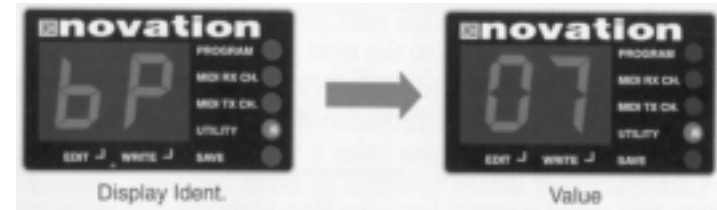
Use the '-' and '+' buttons to change the value. This setting can be saved with the sound - see 'Writing a program into memory' on page 10.

Aftertouch I Breath Pitch Mod Depth

This dual function button is used to set the amount of pitch modulation for either Aftertouch or Breath (MIDI wind controllers). Range = '-7' to '+07'. Press the 'AT/BTH P.MOD' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound. Press the 'AT/BTH P.MOD' button again - the display will now alternate between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound - see 'Writing a program into memory' on page 10.

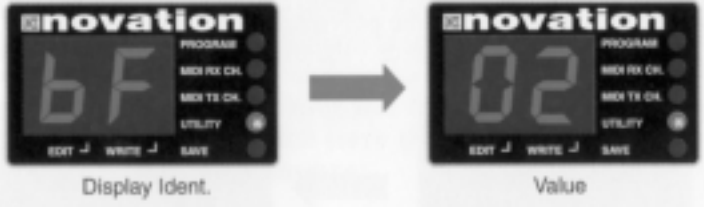
DATA ENTRY / PROGRAM SECTION CONT.

Aftertouch I Breath Filter Mod Depth

This dual function button is used to set the amount of filter modulation for either Aftertouch or Breath (MIDI wind controllers). Range = '-7' to '+07'. Press the AT/BIR F.MOD button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound. Press the 'AT/BTH F.MOD' button again - the display will now alternate between:



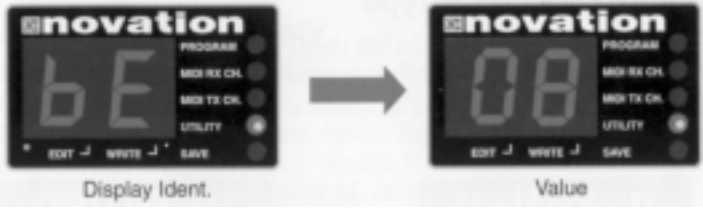
Use the '-' and '+' buttons to change the value. This setting can be saved with the sound.

Aftertouch I Breath Envelope Generator Bias

This dual function button is used to set the amount of EG Bias (Volume) for either Aftertouch or Breath (MIDI wind controllers). Range = '00' to '15'. Press the 'AT/BTH EG BIAS' button once - the display alternates between:



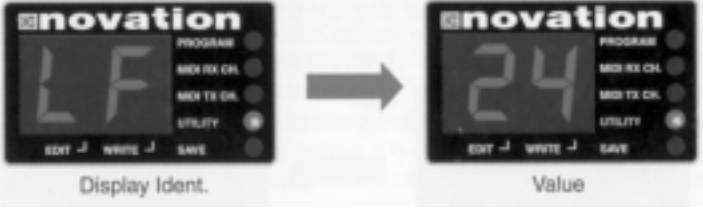
Use the '-' and '+' buttons to change the value. This setting can be saved with the sound. Press the 'AT/BTH EG BIAS' button again - the display will now alternate between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound.

MIDI To LFO Clock Rate

This is where you set the rate to sync the LFO to the MIDI Clock. Range = '0F' to '96'. Press the 'MIDI/LFO CLK' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This setting can be saved with the sound. For further information see the MIDI Control section on page 18.

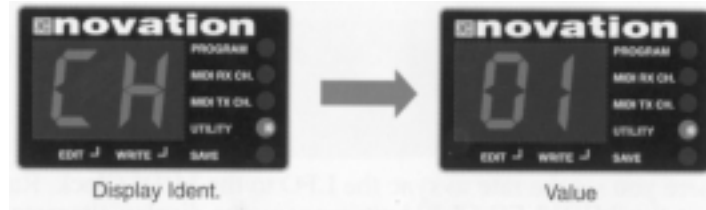
Value	Musical Equivalent	Value	Musical Equivalent
'0F'	OFF	'16'	Quarter note triplet
'02'	Thirtysecond note triplet	'18'	Eighth note dotted
'03'	Thirtysecond note	'24'	Quarter note
'04'	Sixteenth note triplet	'32'	Half note triplet
'06'	Sixteenth note	'36'	Quarter note dotted
'08'	Eighth note triplet	'48'	Half note
'09'	Sixteenth note dotted	'72'	Half note dotted
'12'	Eighth note	'96'	Whole note

HOW THE CONTROLS WORK

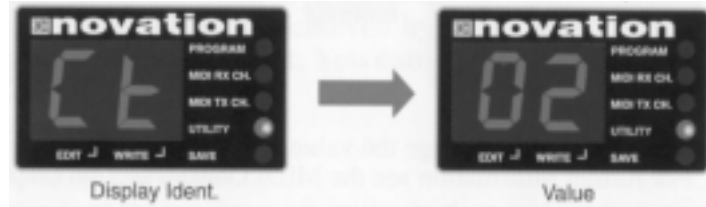
Data Entry I Program Section Cont. CV/Gate MIDI Channel & Type

This dual function button is used to set the CV/Gate convertor MIDI channel. Range = '01' to '16' and the type of system used (Roland. Korg etc.) Range = '00' to '02'.

Press the 'C V/GATE CR.' button once - the display alternates



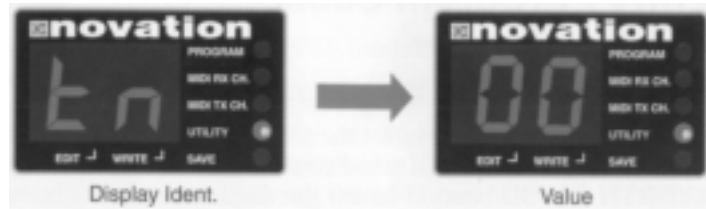
Use the '-' and '+' buttons to change the value. This is a global setting. Press the 'C V/GATE CH.' button again - the display will now alternate between:



Use the '-' and '+' buttons to change the value. This is a global setting. For further information on the different types of CV/Gate system see page 18.

Master Tuning

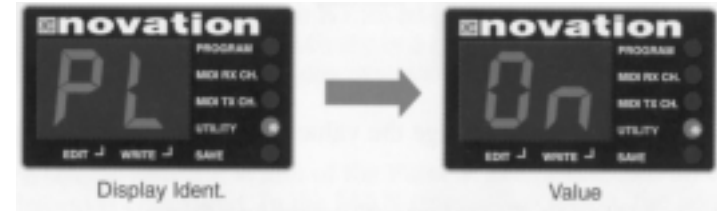
This is where you set the master tuning of the BassStation Rack. When you switch it on, the BassStation Rack automatically tunes itself to concert pitch A-440Hz) so you will not normally need to adjust the tuning. Range = '-9' to '09'. Press the 'TUNING' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. A-440Hz or concert pitch is indicated by '00'. This is a global setting.

Polyphonic Mode

This feature can be used to 'chain' a number of BassStation Racks together to create polyphonic sounds (more than one note). When set to 'On', the BassStation Rack will play the first note it receives and re-transmit the remaining notes and any other information (Pitch bend. Modulation etc) via the MIDI Out socket, thus assigning one note to each unit in the 'chain'. The 'Polyphony' (number of notes played) will depend directly on the number of BassStation Racks connected in the system. i.e. 4 BassStations = 4 note polyphonic, 8 BassStations = 8 note polyphonic etc. Range 'OF' & 'On'. Press the 'POLY MODE' button once - the display alternates between:



Use the '-' and '+' buttons to change the value. This is a global setting.

ADDITIONAL INFORMATION FOR SETTING UP A 'POLY-PHONIC' SYSTEM

MIDI CONNECTIONS: Use the first BassStation Rack in the chain (MIDI In connected to sequencer / keyboard Out) as your 'Master' unit. Connect the MIDI Out of this unit to the MIDI In of the next and so on until the last unit is connected. Next, ensure that the MIDI transmit / receive channels are set to the same value and that 'Poly mode' is set to 'On' on each unit.

Data Entry I Program Section Cont.

PROGRAMS: The program sounds should be identical in every unit so a 'Save All' procedure should be carried out from the 'Master' unit to all the 'Slave' units in the chain - see the 'Save' section on page 9. Now you can use the 'Master' unit to call up the same sound on all the 'Slaves'.

CONTROLLERS: Moving a knob on the 'Master' unit assigned a MIDI controller number (see MIDI Implementation chart) will affect all the units in the 'chain' - for example, moving the 'Master' units Resonance knob will simultaneously change the resonance value of each 'Slave'. **PROGRAM EDITING:** If you need to edit a sound, just play single notes from your sequencer/ keyboard and use the 'Master' unit controls to make the changes. When you are happy with the changes 'Write' the sound into it's memory and repeat the 'Save' procedure as above to load the other units with the updated sound(s). Now you can play the sound again using chords.

Demo

When 'Utility' mode is selected, this button is used to play the BassStation Rack's demonstration sequence. Press the 'AUDITION/DEMO' button once to start the sequence playing. The demo sequence plays a selection of parts using various factory sounds to show the full sonic potential of the BassStation Rack. A General MIDI drum track has also been included in the sequence. To hear the drums, connect a GM compatible drum machine/module to the MIDI Out socket on the rear panel. To stop the sequence at any time, simply press the 'AUDITION/DEMO' button again.

Mode 5 - Save

This is where you 'Save' the BassStation Rack sounds on a computer or other data storage device using MIDI sysex dumps. There are three types of 'Save' as follows:

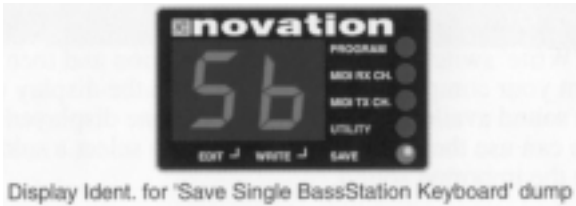
Type	Function	Display Ident.
1	Save single voice - BassStation Rack format	Sr
2	Save single voice - BassStation keyboard format	Sb
3	Save all voices - BassStation Rack format	Ar

Type 2 'Saves' should only be used for loading sounds into a BassStation keyboard. Types 1 & 3 are used to save 'Single' or 'All' sounds from the Bass-Station Rack. Ensure that your data storage device is ready to accept the data. Use the 'Mode' button to select 'SAVE' mode - LED on. the display shows:



NOTE: The sound 'Saved' will be the last sound selected whilst in the 'Program' mode. If you were editing a sound, the modified version will be saved. Press the 'SAVE' ('+') button to transmit the single voice.

To save a single sound in the BassStation keyboard format press the 'SAVE TYPE' ('-' button) once, the display changes to:



REMEMBER: this Save Type must only be used when you want to transfer sounds to a BassStation keyboard. If you accidentally load this 'Save' type back into the BassStation Rack, the sound will have changed due to the differences between the Rack and Keyboard versions. Ensure that your computer or data storage device is ready to accept the sysex bulk dump. Press the 'SAVE' ('+') button to transmit the single voice.

To save all the sounds in the BassStation Rack press the 'SAVE TYPE' button again, the display changes to:



Ensure that your computer or data storage device is ready to accept the sysex bulk dump. Press the 'SAVE' ('+') button to transmit the 'All voice' dump. The Global settings (CV/Gate channel/type. Poly mode status. MIDI Tx and Rx channels) will also be saved.

NOTE: the display will briefly go blank as the data is being transmitted.

HOW THE CONTROLS WORK

Data Entry I Program Section Cont.

Loading Sounds

There are two ways to load a 'Single' sound into the BassStation Rack.

1. If you want to overwrite an existing sound, select the 'Program' mode and call up the program where you want to store the incoming sound. Now, move the 'Write' switch to the 'Enable' position and transmit the sysex dump from your computer. The 'Write' LED on the display will flash to confirm reception. Return the 'Write' switch to 'Protect'.
2. If you want to listen to a sound before committing it to memory, select the 'Program' mode (don't worry about which program number comes up). Ensure that the 'Write' switch is in the 'Protect' position and then transmit the sysex dump from your computer. The 'Edit' LED on the display will come on to show that the sound available is different to the one displayed i.e. an 'edited' sound. Now you can use the 'Compare' procedure to select a suitable program location to store the imported sound.

When you send an 'All' sysex dump to the BassStation Rack, the position of the 'Write' switch will be ignored i.e. all sounds and global settings will be immediately overwritten even if the 'Write' switch is in its 'Protect' position so make sure you have completed a 'Save All' procedure before hand.

Editing A Program

To change or 'Edit' a program, simply adjust the parameters you want to alter. The Edit LED on the display will flash to show that you are no longer listening to the stored memory. If you do not store this new edit before calling up another program it will be lost.

Writing A Program into Memory

The program memory on the BassStation Rack is divided up as follows:

- '00' to '39' 40 factory sounds in ROM. (cannot be overwritten)
- '40' to '99' 60 user sound locations in RAM. (can be overwritten)

If you edit a factory program, you can only save it in one of the 60 user program locations - just think of the 40 factory sounds as a 'Reference library' to take sounds from. If you want to start creating a sound of your own from scratch, use one of the 'Plain Vanilla' tones initially stored in the user program locations.

To store a new or edited sound, move the 'Write' switch to the 'Enable' position - LED flashes. Now, using the 'Data Entry' buttons (0 to 9 only) select the program number where you want to store the sound and press the 'WRITE' button. To store the sound in the same program (40 to 99 only) simply press the 'WRITE' button. If you want to listen to a sound before overwriting it use the 'COMPARE' function as follows: When you have edited a sound, move the 'Write' switch to the 'Enable' position - LED flashes. Press the 'COMPARE' button once - 'Edit' LED flashes at a faster rate to indicate 'Compare' mode is active. You can now listen to the original sound before deciding whether you want to overwrite it or not - check the sound using an external keyboard/computer or the 'Audition' button on the front panel. Pressing the 'COMPARE' again button will bring back the edited sound. If you do want to save the sound in this location, press the 'WRITE' button - 'Write' LED on display panel flashes momentarily. If you don't want to save the sound in this location you can choose another by simply entering any program number from '40' to '99' using the 'Data Entry' keypad (buttons '1' to '0' only - the '-' and '+' cannot be used). Once again, you can check the sounds using the 'COMPARE' feature and then, when you have found a suitable location, press the 'WRITE' button. The sound is now saved - move the 'WRITE' switch back to the 'Protect' position.

NOTE 1: Always remember to move the 'WRITE' switch back to the 'Protect' position after completing a save operation. This will avoid any accidental erasure of sounds - the 'Write Enable' LED flashes to warn you of this condition.

NOTE 2: Sounds can only be saved in the User locations ('40' to '99'). If you attempt to save a sound into any of the Factory locations ('00' to '39') the display digits will flash rapidly to warn that this operation cannot be carried out.



The BassStation features all the classic elements of analogue or 'subtractive' synthesis; two oscillators with standard waveshapes, a voltage-controlled filter with resonance and an LFO and two envelopes for amplitude and filter/pitch/pulse width modulation. The term subtractive gives a clue to the way analogue synthesis works. You start with sound which contains more than you need and remove parts of it until you are left with the required timbre and shape. The oscillators provide the starting sound, each waveshape providing a complex set of harmonics which can be further enriched with de-tuning and pulse width modulation. The filter allows you to remove those harmonics which you don't need and the envelopes allow you to change

both this harmonic content and the volume in real time to give the sound a 'shape'. The LFO allows you to control the speed of vibrato and other regular timbral changes.

If you are already familiar with the basics of analogue synthesis you can use this section as a reference guide to exactly how any element is programmed and routed, but if you are new to this analogue business (having grown up on sample replay instruments - welcome back to the real synthesiser), you should get a good grounding in the basics of synthesis by working your way through each section.

HOW THE CONTROLS WORK

LFO Section



The LFO (Low Frequency Oscillator) produces regular electronic variations which are too low to be heard when converted into audio vibrations. However, they can be used to modify various elements of the sound, producing regular changes in pitch (vibrato), pulse width or filter cut-off (two different controls on the harmonic content of the sound).

Speed - Rotary

This knob controls the rate at which these changes take place and a visual indication of the speed set is given by the flashing of the LED directly below this knob. Faster speeds are set by turning the knob to the right and are more suitable for vibrato and tremolo effects whilst slower speeds to the left are more pleasing for Pulse Width changes of harmonic content.

Using a Modulation/Controller wheel to open & close the filter.

1. Move the Speed knob fully left to its '0' position. This will stop the LFO running completely - speed LED stays on.
2. Select the 24dB mode and turn the Frequency knob fully to the left - Filter closed.
3. Using the Mod Source switch, set 'LFO' and 'Env 2' to zero (knob in central position).

Now you can use the Modulation/Controller Wheel to open and close the Filter.

Delay - Rotary

This knob controls how long after the note is struck the LFO begins to take effect. If the knob is all the way to the left, the LFO effect will begin immediately. As the knob is turned to the right it will take increasingly longer for the LFO effect to be introduced. This is particularly useful for vibrato effects which if present, as the note is struck, can make the note sound out of tune. By setting the LFO Delay to the right, the LFO effect will not be introduced until after the note is struck, thereby removing the problem. If you have problems getting the LFO to take effect, make sure the Delay knob is not set all the way to the right!

Shape - Switch

This switch selects the waveform which defines the "shape" of the LFO movement. The options are as follows:

R'DOM - This stands for random, sometimes also referred to as Sample & Hold. At a regular interval (governed by the Speed knob), the level of the LFO jumps to a new random level and stays there until the next jump. This creates a rhythmic effect particularly if routed to the Filter Cut-off (see Filter Section). Routing this to Pitch gives a less musical result, but is useful for computer or machinery sound effects.

TRI - Short for Triangle, this waveform gives the smoothest, continuous change in level to the LFO and is therefore probably the most generally useful setting. When routed to Pitch, it gives you vibrato (if used with higher speed and lesser depth) or a siren effect (with lower speed and greater depth). If routed to Filter Cut-off, a tremolo or "Leslie" effect results.

SAW - This waveform looks like the teeth of a saw (from which it gets its name) and gives you a falling level which then jumps back up to the full level. Routed to the Filter Cut-off, it produces a rhythmic pulse effect, similar to a sequenced repeated bass line. Routing it to Pitch produces "alarm" type sounds.

LFO to MIDI Clock Sync.

You can synchronise the LFO to the MIDI clock for various applications. See page 7 and 18 for more information.

Oscillators 1 & 2 Section



Each oscillator is a sound source producing the electronic equivalent of the vibration in the air which makes a sound (the speakers you are using to listen to the BassStation convert the electronic signal into an acoustic one you can actually hear). Oscillation is a technical term for vibration. The actual timbre of each oscillator depends on its harmonic content which is determined by its Waveform. Each oscillator has this switch allowing you to switch between two different waveform types which have their individual set of harmonics. The two waveforms are:

Sawtooth (or Ramp)

So called because a series of sawtooth oscillations resembles the teeth on a saw. The sawtooth waveform contains every harmonic in the harmonic series in decreasing volume. Sawtooth waveforms make a very rich sound.

Pulse (including Square)

This waveform switches between maximum and minimum values, giving the blocky look to the waveform. The harmonic content of the pulse waveform is dependent on the relative width of the maximum and minimum values. If these are equal, then the waveform is referred to as a square wave and has a very similar harmonic content to a clarinet. ie. all the odd-numbered harmonics in decreasing volume which gives a hollow quality to the sound. The width of the pulse wave is controlled by the Pulse Width knob and the modulations in narrower (to the far right of the knob), the fundamental (the basic pitch) of the oscillator becomes very quiet and is increasingly over-powered by the higher harmonics producing a very thin sound.

Osc 1/2/External Mix - Rotary

This knob controls the relative volumes of the two oscillators and the external audio input. All the way to the left will give you just the external signal - if nothing is connected to the External Audio Input socket the BassStation's filter can be heard without the oscillators. As the knob is turned to the right, oscillator 1 will be gradually introduced. At the "1 & 2" position both oscillators and the external signal will be equally loud. Moving the knob all the way to right gives you just oscillator 2. For more information on the External Audio Input see page 16.

Detune - Rotary

This knob controls the amount of fine tuning difference between the two oscillators. In its central position the oscillators will be exactly in tune with each other. Turning the knob anti-clockwise will make oscillator 2 increasingly "Flat" in relation to oscillator 1. Turning the knob in a clockwise direction will make oscillator 2 increasingly "Sharp". Slight detunings will enrich the sound by introducing a beating between the oscillators (in the same way a 12-string guitar sounds richer than a 6-string) allowing you to 'fatten' up bass and lead sounds. Greater amounts of detuning will lead to more extreme effects. Use according to your own taste.

Semi-Tone - Rotary

This knob allows you to switch the musical interval between the oscillators in semi-tones up to a full octave, by raising the pitch of oscillator 2. The most conventionally useful intervals are set by switching to 5 (a perfect 4th), 7 (a perfect 5th), with 3 (minor 3rd), 4 (major 3rd), 8 (minor 6th) and 9 (major 6th) following closely behind. Other fixed intervals are only for the more experimental.

Oscillator 2 Range - Switch

This switch allows you to select the octave difference between the oscillators by switching oscillator 2 up or down. The range is referred to in feet (16', 8', 4' & 2'), a convention which comes from the length of organ pipes. The 8 setting puts the two oscillators in the same octave range.

HOW THE CONTROLS WORK

Oscillator 1 & 2 Mod/Sync. Section



This section allows you to setup modulations (automatic changes) to the pitch timbre of the oscillators whilst they are playing back. This gives the sound more "life", by making it more interesting to the ear. Pitch changes include the amount of vibrato and auto bends or slides. Timbral changes are achieved by varying the pulse width and thereby the harmonic content. You can also set the oscillators to synchronise.

Oscillator 1 2 - Switch

This switch selects the oscillator whose modulation you are currently setting. Any changes you make to the three knobs and the 'PWM Source' switch will be applied to whichever oscillator is currently selected. When you switch to the other oscillator, you will need to alter the positions of the knobs and switches in this section to make their current positions apply to the new oscillator, otherwise the previous settings will still apply.

Envelope - Rotary

This knob controls the amount of pitch modulation to the currently selected oscillator (see above) from envelope 2. In the centre position there is no effect on the oscillator's pitch, to the left the effect is negative (ie. the pitch drops and then rises) and to the right positive (the pitch rises and then falls). The further you set the knob from the central position the further the pitch rises and falls. See the "Envelope Section" later for the exact programming of the rise and fall times.

LFO -Rotary

This knob controls the amount of pitch modulation to the oscillator. ie. how much above and below the set pitch the oscillator regularly rises and falls. If the LFO is set to Triangle wave and it's speed is above the centre of its range. then this will normally produce a vibrato effect, but other effects like a siren or seagull cries are possible with

more extreme settings. See the LEO section on page 12 for more details on adjusting the LEO parameters to create these effects.

Pulse Width - Rotary

This knob has a direct effect on the Pulse Width when the waveform of the selected oscillator is set to Pulse (Square). When the Mod Source switch is set to Manual, the position of this knob controls the actual width of the Pulse. At the far left, the Width is 50% (ie. minimum and maximum values are of equal length) giving a special case which we refer to as a square wave, which contains all the odd-numbered harmonics giving a 'hollow' sound reminiscent of a clarinet. As you move the knob to the right the Pulse Width gets narrower and more and more high harmonics are added at the expense of the fundamental pitch giving the sound a thin, trebly quality. At the far right the fundamental has almost disappeared and the sound becomes very thin indeed. When the Mod Source switch is set to Env 2 or LEO, this knob governs the amount of variation in the pulse width in a negative or positive direction about a central 'off position'. As the knob is moved to the left, the variation in the Pulse Width will increase progressively in a negative manner whilst moving it to the right will vary the Pulse Width in a positive manner.

PWM Source - Switch

This switch selects how the Width of the Pulse Wave (if selected on either or both oscillators) is controlled. In the MAN (manual) position, the width is directly controlled by the position of the Pulse Width knob above. In the ENV 2 position, the variation in the Pulse Width is controlled by the second Envelope, starting and finishing at 50% with the amount of shift away from this setting being controlled by the Pulse Width knob above. In the LFO position, the variation of the Pulse Width around the central 50% is controlled by an additional fixed speed, internal LFO (not to be confused with the main variable LFO on the front panel), with the amount of variation being controlled by the Pulse Width knob above. Variation in the harmonic content of an oscillator (which is what changing the Pulse Width achieves) is very pleasing to the ear, especially at lower pitches where all the associated harmonics fall within the audio range and can clearly be heard. When selected to Env 2, the effect is best appreciated using fairly slow changes, so longer Envelope 2 Attack and Decay times are best.

Oscillator 1&2 Mod/Sync. Section Cont.

Oscillator Sync.

This facility causes the waveform of oscillator 2 to restart its cycle each time oscillator 1 starts its cycle, whatever the difference in timing would otherwise be if they were not synchronised. The effect of this is to keep the pitch identical (so settings of the De-tune and Semitone knobs will appear not to work), but make radical changes to the timbre of the sounds. This is particularly noticeable if you use Env 2 to move the nominal pitch of oscillator. 2. The pitch will not change if sync is switched on, but you will hear timbral changes similar to the resonant changes in the human voice. You will find this easier to understand if you set up a very drastic (and probably unmusical) pitch change effect just on oscillator 2 using Env 2 before you switch Osc 1-2 Sync on and then switch the sync on and off to hear the difference.

Osc 1-2 Sync.- Switch

This switch activates the synchronization described above.

Try Setting Up This Classic Sync. Sound

FILTER section - select the 24dB Cut-Off mode and set the Frequency to 10,

Resonance to 0 and Mod Depth to 0 (12o'clock position).

OSC 1-2 sections - select square waveforms on both oscillators. Set Osc 2

Range to 4'. Move the Mix knob to the Osc 2 position.

OSC 1 - 2 MOD/SYNC section - select Osc 1 and set all modulations to zero (l 2o'clock positions). Select Osc 2 and set Envelope to +2 and all other modulations to zero.

ENVELOPES section - select 2 on the Envelope switch and set Attack to 0. Decay to 5. Sustain to 0 and Release to 0.

Now move the Osc 1-2 Sync switch to On and the Mix knob to the l&2 position.

Try experimenting with the following controls to alter the sound:
Envelope 2 Decay / Mix / Osc 2 Envelope Mod / Osc 2 Semitone.

Filter Section



This is where the unwanted frequencies in the sound are removed. The filter on the BassStation is the most popular type, a Low Pass Filter, which removes the higher harmonics first and as it is closed down removes the lower harmonics until only the fundamental or nothing is left. This is the type supplied on all synthesizers and the most musically useful, especially for bass.

Frequency - Rotary

This knob controls the basic cut-off frequency of the filter. All the way to the right, the filter is wide open allowing all the frequencies produced by the Oscillators to sound. As you turn the knob to the left it closes the filter, cutting out harmonics, starting with the highest but increasingly lower ones until only the fundamental or nothing at all is allowed to sound (at the far left). If ever the BassStation is making no sound at all and the Volume knob is turned up, the most likely cause is that the Filter is fully closed. Turn the Frequency knob to the right to let the sound out.

Mod Depth - Rotary

This knob controls the amount of change to the filter cut-off set by the Frequency knob to the left. In its central position there is no change to the filter cut-off frequency. To the left of centre there will be an increasing amount of negative modulation. ie. the filter will be closed more and to the right the modulation is positive. ie. the filter will be increasingly opened by the modulation sources. The Filter Mod switch below selects which source will produce this modulation or change in the filter cut-off frequency.

HOW THE CONTROLS WORK

Filter Section - Continued

Resonance - Rotary

This knob allows you to boost or emphasise the frequencies around the Cut-off frequency (set by Frequency knob above). For this reason on some synths this control is known as Emphasis. At the far left there is no boosting of the cut-off frequency, but as you turn to the right this frequency will be boosted until at the far right it goes in to oscillation producing a new pitched element (similar to feedback on an electric guitar). If ever the BassStation produces a high whistling sound, the chances are this knob is too far to the right. Unless you want this self-oscillating effect, keep the resonance control away from the extreme right setting. Increasing the Resonance is very good for bringing out modulation (movement or change) in the filter cut-off frequency, such as in Acid basslines and other very up-front sounds. Keep the resonance to a minimum if you want more subtle less striking sounds.

Cut-Off - Switch

This switch allows you to change how drastically the frequencies above the cut-off point are removed from the sound. In the 12dB position, the cut-off slope is less steep so the higher frequencies are not attenuated (reduced in volume) as much as they are in the 24dB position. This makes the resulting filtering in the 12dB position more subtle than the 24dB, which you should select if you want the cut-off to be more obvious.

Mod Source - Switch

This switch selects the amount of variation in the filter cut-off frequency set by the Modulation knob above using either the LFO and/or Envelope 2. When LFO is selected, the filter cut-off will be moved around the starting point set by the Frequency knob at a rate set by the Speed knob in the LFO Section. The amount of movement is set by the Modulation knob above. When Env 2 is selected, the filter cut-off will be moved away from and back to the starting point set by the Frequency knob. If the Modulation knob is set to a negative amount, the Attack of Envelope 2 will close the filter and the Decay/Release will re-open it back to the starting point. If the amount is positive, the Attack will open the filter further and the Decay/Release will close it back to its starting point. Using positive Modulation from Env 2 will emphasize the attack of the note (especially if the Resonance is turned up), whereas LFO modulation will provide a tremolo effect.

External Audio Input To The Filter

This feature can be used to process an external audio signal through the BassStation Rack's Filter and Envelope sections. Connect the audio output of the device you wish to process to the 'Filter Input' socket, and the MIDI Out to the MIDI In on the BassStation Rack's rear panel. The Envelopes will only open when MIDI data or a vintage synth's Gate trigger pulse are received, so to process a signal from an instrument without this facility you must use a separate MIDI device (sequencer) or Gate pulse to open the Envelopes when you want the sound to occur. Try experimenting with the 'MIX' knob to create a blend of the external signal and the BassStation Rack's own oscillators. See page 3 for connection details.

Envelopes (1 & 2) Section



The envelopes are used to shape the sound over time. Envelope 1 is hard-wired to amplitude or volume. It is used to decide how quickly the sound starts when you hit a note and how it sustains or dies away. Envelope 2 can be used to control Pulse Width, Filter frequency or Pitch changes depending on the settings of the 'PWM Source' switch in the 'Osc 1 - 2 Mod/Sync' section and the 'Filter Mod' switch in the 'Filter' section. Of course, if neither of these is switched to Env 2, you will hear no change when you alter the settings of Envelope 2. Switch one or the other to Env 2 to hear the changes you are making.

Envelope (1 & 2) Section - Continued

Envelope 1, 2, 1 & 2 - Switch

This switch selects which envelope you are currently making changes to. If 1 is selected then changes to the knobs in this section will change the way the amplitude or volume envelope responds when you hit, hold and release a note. If 2 is selected, then changes to the Envelope knobs will affect the Pulse Width and/or Filter Frequency modulation (depending on which is switched to Env 2 in the appropriate sections). If 1&2 is selected, then any changes made will affect both envelopes. N.B. the settings of each envelope will be unaffected until you move the appropriate knobs, as the current settings of those knobs are ignored until they are moved otherwise each Envelope would automatically copy the settings of the other when you switched between them.

Attack - Rotary

This knob sets how quickly the envelope rises to its maximum level when a note is struck. At the far left, this is 1 millisecond (instantaneous to our ears) increasing exponentially to 10 seconds at the far right. This means that the left hand side of the range can make very fine adjustments to quick attack times, whilst greater changes can be made to longer attack times on the right hand side.

Decay - Rotary

This knob sets how quickly the envelope drops off to the sustain level once the maximum level has been reached. At the far left this time is 3 milliseconds (still instantaneous to our ears) increasing exponentially to 10 seconds at the far right. Again fine adjustment of short times can be made on the left and bigger changes to longer decay times on the right.

Sustain - Rotary

This knob sets the level at which the envelope remains after the Decay phase until the note is released. At the far left the envelope will decay all the way to zero without being interrupted. As the knob is moved to the right, the level at which the decay is halted increases until at the far right, there is no decay at all.

Release - Rotary

This knob sets how quickly the envelope drops from the sustain level to zero once the note has been released. At the far left this time is 3 milliseconds (still instantaneous to our ears) increasing exponentially to 10 seconds at the far right. Again fine adjustment of short times can be made on the left and bigger changes to longer release times on the right.

Velocity - Rotary

This knob sets how much effect velocity has on the envelope. Hard key strikes will always make the envelope reach its peak level, but softer strokes will produce a varying peak dependent on the setting of the Velocity knob. At the far left there will be no velocity effect, ie. soft strokes will produce exactly the same effect as hard ones. As you turn the knob to the right, softer strokes will open the envelope less and less, until at the far right the softest stroke will not open the envelope at all. Obviously on envelope 1, this will result in quieter notes from soft key strokes, whereas on envelope 2 softer notes will produce less Pulse Width and/or Filter Frequency Modulation, depending on which are switched to Env 2 in their appropriate sections.

Triggering - Switch

This switch determines how the trigger for the envelopes is derived. The options are as follows:

AUTOGLIDE - In this position, if a note is held down and a second note pressed, the oscillators will glide to the new note without re-running the envelopes. This setting (labeled 'Slide' on Roland's TB303) produces a similar effect to a note slide on a guitar.

SINGLE - In this position, only the first note played (and held) will run the envelopes.

MULTI - In this position, every note played will run the envelopes.

MIDI CONTROL

MIDI Control

In addition to all the standard MIDI functions, the BassStation Rack has the ability to transmit and receive changes to the filter and envelope controls during a performance. You can also synchronise the LFO to the MIDI clock.

Filter Section Controls

The Frequency, Resonance and Mod Depth rotary controls in this section are assigned to the following MIDI controllers

Filter Control Controller Number

Frequency	-	105
Resonance	-	106
Mod Depth	-	107

When any of the knobs in the Filter section are moved, MIDI controller data is transmitted via the MIDI Out socket enabling you to record these changes on your sequencer. If you want to concentrate on playing the notes first, you can go back and 'overdub' any filter changes later to enhance all or part of the performance.

Envelope Section Controls

The Attack, Decay, Sustain, Release and Velocity rotary controls of envelopes 1 & 2 in this section are assigned to the following MIDI controllers:

Envelope Control Controller Number

Env 1	Attack	-	108
	Decay	-	109
	Sustain	-	110
	Release	-	111
	Velocity	-	112
Env2	Attack	-	114
	Decay	-	115
	Sustain	-	116
	Release	-	117
	Velocity	-	118

Once again, you can record any changes made with these controls into a sequencer during a performance or at a later time to enhance the recording.

LFO I MIDI Clock Sync.

When this function is selected, the LFO will trigger in synchronisation with the MIDI Clock at the set rate. This feature can be used for various sweeping effects and rhythmic pulses. NOTE: The BassStation Rack's LFO will take approximately 1 to 2 beats to 'lock in' to the MIDI clock so always allow for this in your sequence. i.e. insert a blank 'count in' period at the beginning of a track. See the 'MIDI / LFO Clock Sync.' section on page 7 for more details on the available time signatures.

CV/Gate To MIDI Convertor

Vintage analogue synths which use Control Voltages (CV) to determine the pitch of the oscillators and a Trigger Pulse (Gate) to open the envelopes can be interfaced with the BassStation Rack and any other MIDI device using this feature. The different types of CV/Gate system used on these older synths can also be set.

Setting Up

Connect the CV/Gate In & Outs from the vintage synth to the respective sockets on the Rack (see page 3). Set the CV/Gate MIDI channel (see page 7). Select the correct CV/Gate Type for the Vintage synth you wish to control from the chart below:

Type	Synthesiser	CV	Gate	Range
00	Roland/ Arp/SCI (Sequential)	Volts per octave + Gate pulse		C0 to C5
01	Yamaha/Korg	Hertz per octave - S/TRIG		C-1 to C5
02	Moog	Volts per octave + S/TRIG		C0 to C5
03	Roland/ Arp/SCI (Sequential)	Volts per octave + Gate pulse		C-1 to C4
04	Yamaha/Korg	Hertz per octave - S/TRIG		C-2 to C4
05	Moog	Volts per octave + S/TRIG		C-1 to C4

Types 03 to 05 will shift the range down one octave allowing access to lower notes on the relevant vintage synthesiser.

Triggering Vintage Analogue Synths from MIDI

You can trigger the vintage synth independently by setting a different MIDI channel to the main MIDI channel of the BassStation Rack, for example - BassStation Rack MIDI Ch. 1 - CV/Gate MIDI Ch.7, or together for combining sounds - BassStation Rack MIDI Ch. 1 - CV/Gate MIDI Ch. 1.

Transmitting MIDI Data Using A Vintage Analogue Synth

You can also use the vintage synths keyboard to play the BassStation Rack or any

Set Up For Roland TB303* Emulation

The Roland TB303

The Roland TB303 Bass Line has a very familiar and unique sound for an analogue synthesiser. The BassStation Rack can emulate this sound and indeed create a much wider range of sounds. The TB303 has a single oscillator and single envelope that control both the level of the sound and the way in which the filter contours that sound. The most frequently used controls on the TB303 are the CUT OFF FREQ, RESONANCE, DECAY and ENV MOD and by tweaking these the well known "bleeps and burps" are attainable.

The BassStation Rack

With its dual oscillators and two envelopes, the BassStation Rack has far greater sound creating capability than the TB303, however to produce the sound of the TB303 it is important to use just a single oscillator and mimic the single envelope. The filter section on the BassStation Rack has been designed such that when the CUT-OFF switch is in the 12dB position the FREQUENCY, RESONANCE, MOD DEPTH and ENVELOPE 2 DECAY controls act in a similar fashion to the TB303.

Setting Up A TB303 Sound

Turn the PORTAMENTO control to 2. In the OSC 1 section, turn the MIX control to the 'Osc 1' position in order to only listen to oscillator 1. The WAVEFORM switch may be set as desired since the TB303 also has this selection switch. For the moment set it to Sawtooth.

In the OSC 1-2 MODULATION section set the OSCILLATOR 1 2 switch to position 1 and make sure that the ENVELOPE and LFO controls are set to 0 (central position). Set the OSC 1 2 SYNC switch to Off. The TB303 does not have these controls so we want to make sure they have no effect.

In the filter section set the CUT - OFF switch to the 12dB position. Set the MOD SOURCE switch to the LFO position and turn the MOD DEPTH control to its middle position. Again, the TB303 does not have this control so any LFO modulation must be removed. Now, set the MOD SOURCE switch back to the ENV 2 position. In the 12dB position the MOD SOURCE control does not act as shown on the label i.e. there is only positive MOD available between 0 (fully anti-clockwise) and 10 (fully clockwise) as on the TB303.

Set the ENVELOPE switch to I so the envelope controls have an affect on envelope I. Set the ATTACK to 0, DECAY to 4, SUSTAIN to 10 and RELEASE to 3. Move the ENVELOPE switch to 2 and set the ATTACK to 0, SUSTAIN to 0 and RELEASE to 3.

The DECAY control can now be adjusted as on the TB303.

The VELOCITY can be adjusted as desired but for now, set it to 0 so that the volume is always the same no matter how hard a note is played. To get the twangy" TB303 sound turn the RESONANCE control up. When the control is set to 8 the sound should get more "Watery". To simulate the glide on the TB303, switch to AUTOGLIDE in the ENVELOPE section. If you play a note and then, whilst holding it, play another one, the new note will glide or slur' up to the new pitch. If it goes instantly to the new pitch adjust the Portamento control a little until the glide is noticeable.

Once you are happy with this new sound save it in a memory for future use.

* Copyright Roland Corporation, Japan

Troubleshooting Guide

If the BassStation Rack does not operate as expected, make reference to the troubleshooting guide below. Remember in most cases, problems that appear to be caused by equipment malfunction can often be traced to human error.

Problem	Possible Causes
No power	Power supply not connected correctly Check polarity of 9v DC output plug (center pin +.)
No sound	'Volume' knob set at '0' Program saved with 'Mix' knob set to 'Ext.' (no external input signal) MIDI volume set to zero Filter, Resonance, Decay or Sustain knobs set to '0'
Single note trigger	Poly Mode set to 'ON'

APPENDIX

Specification

Monophonic Sound Source:

Oscillator 1

Range	C-2 to C7
Waveform	Square/Sawtooth/Pulse (Continuously variable)
Pulse Width Modulation	Variable depth control and source of Modulation selectable from Manual, LFO or Envelope 2
Master Fine	+/-50 Cents tune

Oscillator 2

Range	C-3 to C10
Waveform	Square/Sawtooth/Pulse (Continuously variable)
Semi-tone Tune	+12 Semi-tones
Detune	+1-50 Cents
Sync.	Oscillator 1 - 2 sync.

Mixer

Range	Variable mix control between
Oscillator	1, 2 and external source

Filter

Cut-off Frequency	5Hz to 10KHz
Resonance	0 to Self Oscillation (24dB)
Envelope	Variable + and - control of Envelope 2 depth of Modulation
Cut-off slope	Switchable between 12dB and 24dB
LFO	Variable + and - control of LFO depth of Modulation
Input	External audio input to filter

Envelope 1

Attack time	500 Microsecs to 5 Secs
Decay time	3ms to 10 Secs
Sustain level	
Release time	3ms to 10 Secs
Velocity	Variable sensitivity control

Envelope 2

Attack time	500 Microsecs to 5 Secs
Decay time	3ms to 10 Secs
Sustain level	
Release time	3ms to 10 Secs
Velocity	Variable sensitivity control

Triggering

Autoglide	2nd key pressed triggers oscillator glide to new note with out re-running envelopes
Single	No re-runs of envelopes
Multi	Re-runs envelopes

VCA

Master volume control	
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Portamento

Range	Auto, 0 to 5 Secs ramp time
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MIDI

Program	100 Memories - 40 factory/ 60 user
Change:	
Filter:	Frequency, Resonance and Mod Depth
Envelopes:	Attack, Decay, Sustain, Release & Velocity on Envelopes 1&2
LFO:	Re-trigger to MIDI clock.
Controllers:	Pitch bend, Pitch mod, Filter mod, Aftertouch/Breath pitch mod, Aftertouch/Breath filter mod, Aftertouch/Breath env. generator bias.
CV/Gate:	CV/Gate in/out to MIDI convertor.

Connections

MIDI :	In, Out, Thru.
CV/Gate:	CV in, Gate in, CV out, Gate out
Filter:	External audio input
Outputs:	Line out & Headphone
Power:	9vDC input

Dimensions I Weight

Case style:	1 U
Width :	483mm (19.2")
Depth:	100mm (3.9")
Height:	44mm (1.75")
Weight:	Less than 2Kg

Specification subject to change without prior notice.

MIDI Implementation Chart

Function	Transmitted	Recognised	Remarks
Basic Default Channel Changed	1 - 16	1 - 16	Memorised
Mode Default Messages Altered	x *****	4 x	
Note True Voice	24 - 72 *****	12 - 120 12 - 120	
Velocity Note ON Note OFF	x x	o o v=1-127	
After Keys Ch's	x x	x o	
Pitch Bender	x	o 0-12 semi	7 bit resolution
Control Change	1 x 2 x 7 x 105 o 106 o 107 o 108 o 109 o 110 o 111 o 112 o 114 o 115 o 116 o 117 o 118 o	o o o o o o o o o o o o o o o o	Modulation Wheel Breath control Volume Filter frequency Filter resonance Filter mod depth Env1 Attack Env1 Decay Env1 Sustain Env1 Release Env1 Velocity Env2 Attack Env2 Decay Env2 Sustain Env2 Release Env2 Velocity
Program change True *	o 0 - 99 *****	o 0 - 99	
System exclusive	o	o	Voice parameters
System :Clock Real Time	x	o	Start, Stop, Continue
Aux messages :Local ON/OFF :All Notes OFF :Active Sense :Reset	x x x x	 o x x	
Mode 1 : OMNI ON,POLY Mode 3 : OMNI ON,MONO Mode 2 : OMNI OFF, POLY Mode 4 : OMNI OFF,MONO			

Version : 1.0 Date : 1st - April - 1995 o = Yes x = No



FACTORY PROGRAMS LIST

Factory Program List

Number Name

00MOOGBASS
01WOW BASS
02JACKO BASS
03SOFT BASS
04ELECTRIC BASS
05BIRDLAND BASS
06PERCUSSIVE BASS
07EOW BASS
08POWER BASS
09FREAKPOWER BASS
10TB303AUTOGLIDE BASS
11SPITSINE BASS
12TB303 EOW BASS
13TB303 SQUARE BASS
14THUD BASS
15AMBIENT TB303
16TRANCE 1
17TRANCE 2
18SPIT
19RAINMAN
20YAZOO LEAD
21ORGAN BASS
22CLAVY LEAD
23PLUCK LEAD
24LFO FILTER FADE BASS
25SQUARE BASS
26WOW BASS
27WOWEOW BASS
28HARD SYNC LEAD
29SQUARE PORTA LEAD
30SYNC 0 LEAD
31SYNC I LEAD
32PT POWER LEAD
33LOVE DON'T LEAD
34DUCK LEAD
35OLAVE LEAD
36WHISTLE LEAD
37YAZ2LEAD
38SYNC3LEAD
39RESONANT LEAD

NOTE To access the lower range of Bass sounds where both oscillators are set to 8" (factory or user), set your master keyboard or sequencer to -12 (- one octave).