CIRCUIT

user guide



novation

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INTRODUCTION

Thank you for purchasing this Novation Circuit: the inspirational grid-based Groovebox. Circuit is a great electronic musical instrument based on two Novation MiniNova synth engines, four drum parts and a 6-track, 16-step sequencer.

Circuit has been designed to let you create music fast: getting great rhythm patterns together is quick and easy. It's both a compositional tool and a live performance instrument. You don't need to connect Circuit to a computer or other device to make music – it's completely standalone, and can run off batteries if you wish. If you're working in the studio, Novation's superior sound quality means you can use Circuit as the basis of your finished track.

Circuit's playing grid is a set of 32 illuminated, velocity-sensitive rubber pads, which can act as synth keys, drum pads, sequencer steps and perform numerous other functions. The pads' internal illumination is intelligently RGB colour-coded*, so you can see at a glance what's going on.

Eight rotary controls are provided to let you tweak the synth and drum sounds to perfection and a large Filter control is always available to further enhance your performance. There are a host of other quickly-accessible features: Synth patches and drum sounds to choose from, a choice of musical scales, adjustable tempo, swing and note length, and more. You can assemble sequences together into longer patterns and save your work in one of 32 session memories.

Circuit also sends and receives standard MIDI data, so you can connect other MIDI-compatible devices, synchronise with other drum machines or grooveboxes, or to trigger synths, for example. The USB connection also handles MIDI; this lets you connect Circuit to your computer so you can synchronise and record MIDI data in your DAW.

For additional information, up to date support articles and a form to contact our Technical Support Team please visit the Novation Answerbase at: www.novationmusic.com/answerbase

* RGB LED illumination means that each pad has internal red, blue and green LEDs, each of which can light at different intensities. By combining the three colours at different brightness levels, almost any colour of illumination can be achieved.

Key Features

- Combines two MiniNova synth engines and four drum parts
- 32-button multi-colour grid for playing and displaying information
- Split grid displays sequence steps and notes simultaneously
- Velocity-sensitive pads
- 64 synth Patches
- 64 drum sounds
- Tempo range from 40 to 240 BPM, plus tap mode
- Adjustable Swing
- Patterns can be chained together
- Pattern Nudge and Length adjustment
- 12-octave (-6, +5) range
- Eight macro controls for further “tweaking” of sounds
- Classic synth-style Filter control
- Built-in mixer
- FX section
- Clear and Duplicate functions
- Adjustable Note Velocity and Gate (Length)
- 32 Session slots
- Stereo line output
- Separate headphone output
- USB port for MIDI data and firmware update
- Internal speaker
- Runs off external AC adaptor (supplied) or 6 x AA batteries (supplied)

About This Manual

We’ve tried to make this manual as helpful as possible for all types of user, both newcomers to electronic music making and those with more experience, and this inevitably means some users will want to skip over certain parts of it, while relative novices will want to avoid certain parts of it until they’re confident they’ve mastered the basics.

However, there are a few general points that are useful to know about before you continue reading the manual. We’ve adopted some graphical conventions within the text, which we hope all types of user will find helpful in navigating through the information to find what they need to know quickly:

Abbreviations, conventions, etc.
Where top panel controls or rear panel connectors are referred to, we've used a number thus: 6 to cross-reference to the top panel diagram, and thus: (1) to cross-reference to the rear panel diagram. (See "Top View – controls" on page 12 and "Rear View – connectors" on page 15).

We've used **Bold text** to name physical things – the top panel controls and rear panel connectors, and ***smaller Bold italics*** to name the various Views that the grid can display.

Tips



These do what it says on the tin: we include bits of advice, relevant to the topic being discussed that should simplify setting up Circuit to do what you want. It's not mandatory that you follow them, but generally they should make life easier.

What's In The Box

Circuit has been carefully packed in the factory and the packaging was designed to withstand rough handling. Should the unit appear to have been damaged in transit, do not discard any of the packing material and notify your music dealer.

If practical, save the packing materials for future use in case you ever need to ship the unit again.

Please check the list below against the contents of the packaging. If any items are missing or damaged, contact the Novation dealer or distributor where you purchased the unit.

- Novation Circuit Groovebox
- USB Type A to Type B cable (1.5 m)
- 2 x MIDI break-out cables: 3.5 mm 3-pole jack plug to 5-pin DIN socket
- Getting Started Guide, including Product/software Registration details
- Registration card for Ableton Live Lite recording software
- Patches reference sheet
- Safety information sheet
- AC adaptor: 12 V DC, 1.5 A; includes interchangeable AC plugs
- 6 x AA Alkaline batteries

Registering your Circuit

It is important to register your Circuit on-line using the Product/software Registration details at Step 4 of the Getting Started Guide. Apart from validating your manufacturer's warranty, you will also then be able to download the additional software that you are entitled to as a Circuit owner:

- Ableton Live Lite music making software
- 1 GB of Loopmasters sounds and samples

The registration details also contain codes you will need to enter in the on-line forms on our website to download the software, but before you attempt to do this, warranty registration is required.

Power Requirements

Circuit can be powered either from AC mains via the AC adaptor supplied, or from AA batteries.

It cannot be powered from a computer or other device via a USB connection.

Using the AC adaptor

The AC adaptor supplied with the unit is a 12 V DC, 1.5 A type, and can operate on mains voltages from 100 V to 240 V, 50 or 60 Hz. The adaptor has interchangeable slide-in AC plug heads; different plug heads are supplied which make the adaptor compatible with AC outlets in many different countries. Plug heads can be easily swapped if necessary by pressing the spring-loaded semi-circular button in the centre of the adaptor and sliding the plug head upwards to separate it from the adaptor body. Then slide in the correct plug head (as shown by the arrows), ensuring that it locks firmly in place.

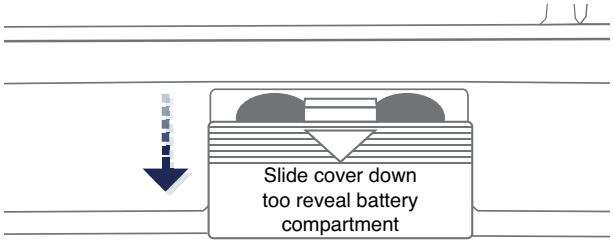
The cable from the AC adaptor connects to the coaxial DC input socket on the rear panel of Circuit (④ on “Rear View – connectors” on page 15).

The use of AC adaptors of a type other than that supplied is not recommended. Please contact your Novation dealer for advice on alternative PSUs if necessary.

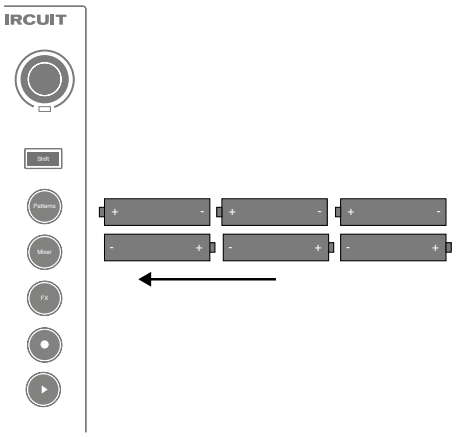
Using batteries

Circuit will also operate from six AA-size R6 Alkaline or high-capacity Lithium batteries. A set of suitable batteries is supplied.

The battery compartment is on the right-hand side of the unit. Slide the compartment cover downwards to open it; note the cover has a retaining strap.



Insert the batteries in two sets of three, as shown by the diagram on the base of the unit immediately below the battery compartment:



Notes:

- Circuit will accept both 1.5 V non-rechargeable and 1.2 V NiMH rechargeable batteries in AA-size. In the case of non-rechargeable batteries, we recommend the use of either Alkaline or high-capacity Lithium types.
- Never mix battery types. Always ensure that all six batteries are of the same type.
- Battery life is dependent on type: up to five hours use should be obtainable from high-quality Alkaline types.
- Circuit does NOT charge rechargeable NiMH cells while installed; these must be recharged externally in a suitable charger.
- Do not mix cells that are charged to a different degree – i.e., don’t mix brand new cells with partially-run-down ones.
- Always remove batteries from your Circuit if it is not to be used for a long period.
- Spent batteries contain hazardous substances and should be disposed of in a responsible manner. Always dispose of used batteries in accordance with local environmental and/or recycling guidelines.

HARDWARE OVERVIEW

Glossary

Some of the terms used in this manual have a specific meaning as applied to Circuit. Here is a short list:

Term	Button	Definition
Expanded View	**Shift + Note**	Doubles the area of performance pads for the Synths, and a “tap” hit mode for the Drums.
Fixed	**Shift + Velocity**	Allows the velocity response of the grid pads to be disabled.
FX View	**FX**	Allows the user to add reverb and delay to individual tracks.
Gate View	**Gate**	The Gate value of a note is how many steps it sounds for. Gate View allows the length of a step to be edited. Individual gate values can be set for each note assigned to a single step by using live record.
Grid pad		One of the 32 pads making up the main performance area.
Length View	**Length**	Allows the user to alter the length of a synth pattern; values can be between 1 and 16 steps.
Live Record	**Record**	Lets you add synth notes in real time while a pattern is playing. Also records any movements of the Macro controls.
Macro Controls		Eight rotary controls whose function varies with the currently selected View; primarily used to “tweak” the synth and drum sounds.
Manual Note Entry		Assignment of synth notes to specific step in a pattern. With a step pad pressed, press the performance pad for the note to be added. Can be done with the sequencer either running or stopped.
Note View	**Note**	The View that is used to enter synth notes and drum hits.
Nudge View	**Nudge**	Allows all the steps of a Pattern to be nudged forwards or backwards in time in one-step increments.
Patch		Synonymous with “Preset”; one of the 64 synth or 64 drum sounds which can be selected for each track.
Pattern		A repeating cycle of synth notes and/or drum hits of up to 16 steps. Includes data for velocity, gate, length and automation.
PATTERN buttons		Collective name for the button group comprising the **Nudge** and **Length** buttons.

Term	Button	Definition
Pattern Chain		A cyclic set of Patterns played continuously one after the other.
Pattern memory		Where a Pattern is stored; there are eight per track in each Session.
Patterns View	**Patterns**	This View displays the eight Pattern memories per track, and allows their selection individually or as a Pattern Chain, deletion and duplication.
Performance Pad		The grid pads used to enter synth notes or drum hits.
Playback Cursor		In playback, the white pad which moves through the pattern display, indicating which step is currently being played. Changes to red in Record Mode.
Playback Mode		Circuit's operating mode with the sequencer running; the **Play** button will be lit bright green.
Record Mode		Circuit's operating mode when synth notes can be added to the Pattern, or when adjustments using the Macro controls can be saved. The **Record** button will be lit bright red.
Scale View	**Scales**	Allows the user to select one of 16 musical scales for the synth and also to transpose the scales.
Session		A set of all necessary data for full playback of all tracks, including Patterns, Sequences, automation data, etc. Up to 32 Sessions can be saved in flash memory.
Session View	**Sessions**	The View used to save and load Sessions
Setup Page		Allows control of MIDI clock and TX / RX settings. Normal Circuit operation is suspended while Setup Page is open.
Sidechain	**Sidechain**	A method of allowing the hits of the Drum 1 track to modify the dynamics of Synth notes.
Step		Each Pattern is divided into Steps; Drum Patterns always have 16 Steps, while Synths may have fewer.
STEP buttons		Collective name for the button group comprising the **Note**, **Velocity**, and **Gate** buttons.
Stop Mode		Circuit's operating mode when the sequencer is not running.
Track		One of the 6 instruments in a Session: Synth 1, Synth 2, Drum 1, Drum 2, Drum 3, Drum 4.
Velocity View	**Velocity**	Allows editing of the velocity of a step.
View		One of various ways the 32 grid pads can be used to display information and allow user interaction.

Top View – controls



1 32-pad playing grid – a 4 x 8 matrix of rubber pads; internally illuminated with RGB LEDs. Depending on the view selected, the grid may be “split” into logical areas with different functions.

2 **Filter** – large diameter rotary control with a centre detent and RGB LED: controls filter frequency like on an analogue synth. It is always active.

3 Macro controls **1** to **8** – eight multi-functional rotary encoders, with associated RGB LED. The availability and function of these controls varies across Circuit’s other views. The movement of Macro controls in performance may be recorded and replayed.

4 **Master Volume** – controls the overall level of Circuit’s audio outputs.

Most of the remaining buttons switch the 32-pad grid into a specific ***View***. Each ***View*** provides information and control of a particular aspect of the track, pattern, sounds, timing, etc.

Most of the buttons have both a momentary (long press) and a latching (short press) mode. A long press will temporarily display that button's view, but only while the button is held down. When released the view will revert to whatever it was before the button was pressed. A short press on a button will switch the grid view to that programmed into the button.

5 Track buttons: **SYNTH 1**/**SYNTH 2**/**DRUMS** – these eight buttons select different grid ***views***. Their operation varies slightly depending on other user actions.

6 **STEP** buttons: **Note**, **Velocity** & **Gate** – these switch the grid to further ***views***, and allow the parameters of each step of the pattern to be individually entered, deleted or modified.

7 **PATTERN** buttons: **Nudge** & **Length** – switch the grid to ***views*** that allow adjustment of pattern length and timing.

8 **Scales** – this button allows the selection of one of sixteen different music scales for the synth keyboard, and also lets you transpose the synth keyboard to a higher or lower key.

9 **Patterns** – lets you store multiple patterns for each synth and drum track, and to join them together to make a pattern Chain.

10 **Mixer** – enables ***Mixer view***, where you can mute or adjust the level of each synth and drum making up the sequence.

11 **FX** – opens ***FX view***; lets you add reverb and delay effects to each synth and drum individually.

12 Play and Record – these two buttons start and stop the sequence (Play) and enter Record mode (Record). In Play mode anything you play on the grid will be heard; in Record mode, anything you play will be heard and also added to the sequence.

13 **Oct** ▼ and **Oct** ▲ – these let you shift the synth pads' pitch by one to five octaves or down by one to six octaves. The pitch range of each of the two synths is adjustable independently.

14 **Tempo** – lets you set the BPM (tempo) of the sequence, using Macro control 1.

15 **Swing** – alters the timing between steps to change the 'feel' of a pattern, also using Macro 1 for adjustment.

16 **Clear** – allows deletion of individual sequence steps, stored Macro control movements, Patterns or Sessions.

17 **Duplicate** – operates like a copy-and-paste function for patterns and individual steps.

18 **Save** and **Sessions** – let you save your current Session and open a previously-saved one.

19 **Shift** – several of the buttons have a “second function”, which is accessed by holding down the **Shift** button while pressing the button in question.

20 🎧 (Headphones) – connect a pair of stereo headphones here. The internal speaker is muted when a plug is inserted. The headphone amplifier can drive +5 dBu into a pair of 150 ohm stereo headphones.

21 Battery compartment – accepts six AA-size batteries.

22 Kensington security slot – secure your Circuit to a suitable structure if desired. Please see www.kensington.com/kensington/us/us/s/1704/kensington-security-slot.aspx for further information on how to use this feature.

23 Speaker (in base of unit) – internal loudspeaker fed with a mono mix of Circuit’s output. Note that Circuit’s moulded base provides a gap below the speaker grille; for best results, place Circuit on a hard or reflective surface such as a table or magazine.

Rear View – connectors



① **L/MONO** and **RIGHT** – Circuit's main audio outputs on two ¼" TS jack sockets. Max. output level is +5.3 dBu (+/-1.5 dBu). With no plug in the **RIGHT** socket, the **L/MONO** socket carries a mono mix of L and R channels. The internal speaker is muted when a plug is inserted into either of the main output sockets.

② **MIDI IN** and **OUT** – MIDI connectors on two 3.5 mm TRS jack sockets. Use the break-out cables supplied to convert these to the industry-standard 5-pin DIN sockets.

③ – USB 2.0 port using a Type B socket. A Type B-to-Type A cable is supplied with the unit. The port is MIDI class compliant; connect to computers and other devices supporting MIDI via USB to transmit and receive MIDI data. Also used for firmware updates. NOTE – Circuit's USB port does not carry either DC power or audio.

④ -+ (DC input) – connect the AC adaptor supplied to this coaxial socket.

⑤ **POWER** – "soft" on/off switch; to prevent inadvertent power up/down, a press of approx. one second is needed to turn the unit on or off.

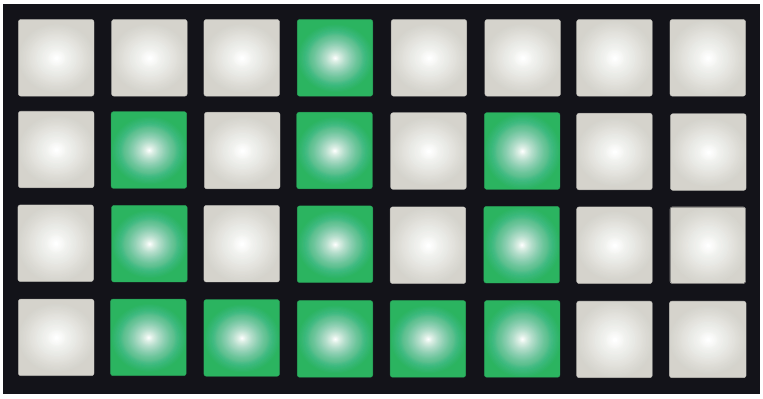
BASICS

Powering the unit on

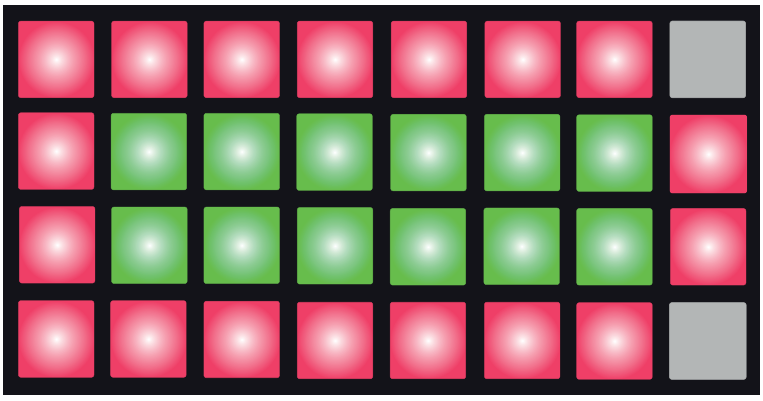
If you haven't fitted batteries into your Circuit, connect the supplied AC adaptor to the DC input socket (4) and plug the adaptor into the AC mains.

Connect the main outputs to a monitoring system (powered speakers or a separate amplifier and passive monitors); alternatively plug in a pair of headphones if you prefer.

Long-press the **POWER** button (5), and the grid will show the boot-up display for approximately five seconds:

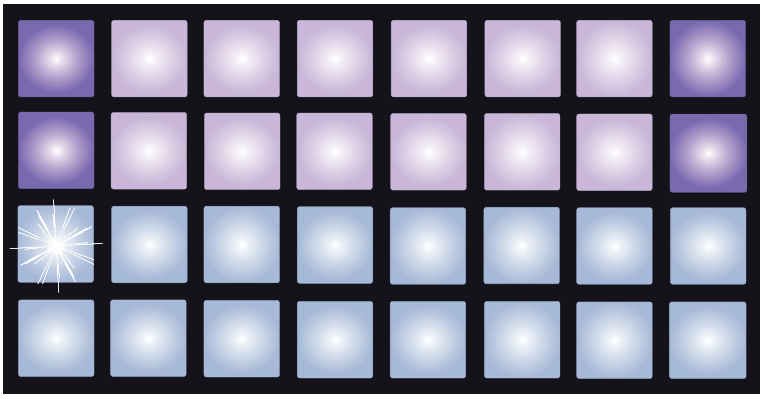


If you're running Circuit from batteries, the boot-up display will look like this:



The diagram above shows the display when the batteries are fresh or at full capacity. The number of pairs of green pads give an idea of the battery condition; fewer green pads means the batteries are running down. When no green pads are showing, the batteries should be changed; otherwise you may lose your work.

After boot-up, the grid display will change to something like that shown below:



Getting started

We've pre-loaded 16 demo Sessions into the memories to give you an idea of how Circuit works. Press the Play button 12 ; you should hear the first demo Session.

If it's not already lit, press the **Synth 1** button 5; Circuit is now displaying ***Note View*** for ***Synth 1***. The two upper rows – the synth pads - show the notes that Synth 1 is contributing to the sequence, while the two lower rows – the sequence steps - show the progression through the sequence. You can see the contributions made by Synth 2 by pressing the **Synth 2** button. Note that the notes of Synth 1 are coded pink and those of Synth 2 green; when the sequence includes a synth note, the pad corresponding to the note changes to white. Similarly, the sequence pads are pale blue, but turn white as the "play cursor" moves through the sequence.

Now press the **Drum 1** button. The displays for the drums differ from those for the synths: the display shows two drums simultaneously - Drum 1 (typically kick) and Drum 2 (typically snare) in this case. The two upper rows represent one drum (Drum 1) and the two lower rows the other (Drum 2). The arrangement for Drums 3 and 4 is identical, except for the colour coding. Drums 3 and 4 are normally variations of cymbal, hi-hat and other percussion sounds.

Note that pads representing steps that have drum hits are lit brightly while those that don't are dim. Try pressing some of the dim pads to add more drum hits; press a bright pad to delete a hit.

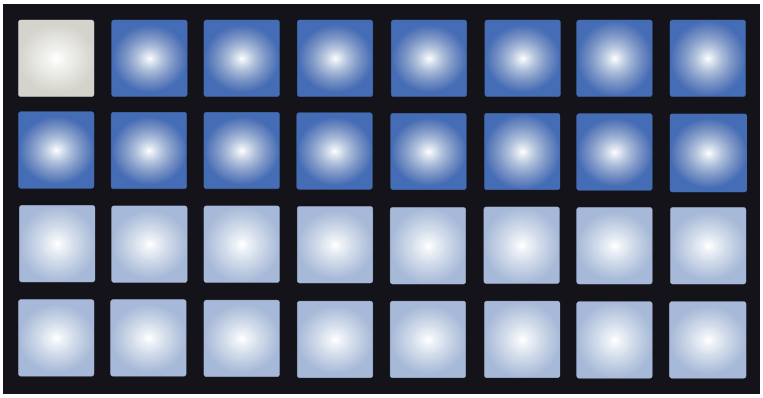
Press the Play button to stop.

Later in the manual, we explain how you can choose the synth and drum sound you want in your pattern, and also how you can manipulate the sounds in real-time.

Loading and Saving

When you press **Play** for the first time after powering on, the Session Circuit will play will be the last one used when it was powered off. The factory demo described in the previous section was loaded in to Memory Slot 1.

To load a different Session, you use ***Sessions View***. Press **Sessions** 18 to open this:



Each pad corresponds to one of the memory slots. The pad's colour indicates the slot's status:

- Dim blue – slot is empty
- Bright blue – slot contains either a Session saved by the user or a factory demo Session
- White – the currently selected Session (only one pad will be white)

If you're still experimenting, you can select a different factory demo to listen to and play around with. You can jump between saved Sessions while in Play mode.

> Sessions loaded when the sequencer is not running will play at the tempo that was in force when the Session was saved.
>
> Sessions loaded while the sequencer is running will play at the tempo that is currently set. This means that you can recall different Sessions sequentially with the confidence that the tempo will remain constant.

There's nothing special about the slots containing factory demo Sessions: you can overwrite these if you wish.

IMPORTANT – ENABLING SAVE
By now you will probably have read the Getting Starting Guide shipped with your Circuit, so will be aware that Session Saving is disabled, but in case you haven't, we're repeating it here:

The Save function is deliberately disabled before shipping from the factory to prevent accidental erasure of the demo Sessions. The **Save** button 18 will initially be unlit, and before you can save any Sessions of your own, you will need to unlock the Save function. To do this, hold down the **Shift** 19 and **Save** buttons together while powering Circuit on. **Save** will now be illuminated blue.

You can choose to disable Save in the same way – hold down **Shift** and **Save** while powering Circuit on, and the **Save** button will no longer be illuminated, indicating that the Save function is now disabled.

Note also that the Clear Session function is also disabled when Save is disabled.

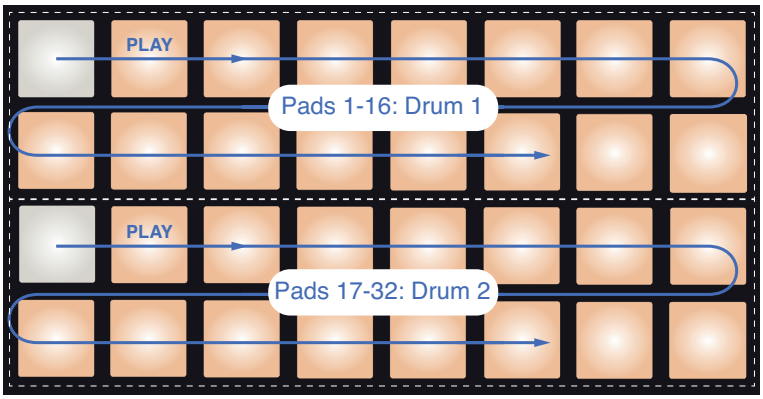
You don't need to be in ***Sessions View*** to save a Session you've been working on. If you press **Save** 18, the button flashes white; if you press it a second time, it blinks green rapidly for a second or so to confirm the save process. However, in this case, your work will be saved in the last selected Session memory, which will most likely be the one that held an earlier version; the earlier version will be overwritten.

To save your work in a different Session memory (leaving the original version unchanged), enter ***Sessions View***. Press **Save**; both **Save** and the pad for the currently selected Session will flash white. Press a different memory pad: all the other pads will go dark, and the selected pad will blink green rapidly for a second or so to confirm the save process.

Starting from Scratch

Once you've experimented with the factory demo patterns for a while, you will probably want to create a pattern from scratch.

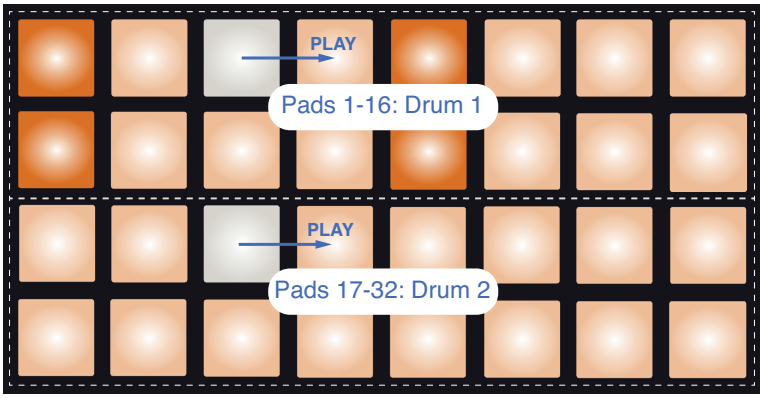
Select **Sessions** and select an empty memory slot. Now select **Drum 1**. When you press Play you'll see the white pad (the play cursor) progressing across the 16 steps of the two drums:



You won't hear anything just yet.
The ***Drum Note Views*** in Circuit are always in pairs: Drum 1 on the two upper rows and Drum 2 on the lower two. Drums 3 and 4 work in exactly the same way.

> **NOTE**
> In Circuit, drum patterns are always 16 hits long. Synth patterns can be of any length from 1 to 16 steps. This topic is explained in "Length" on page 48.

To make a "four-on-the-floor" kick drum, press pads 1, 5, 9 and 13 as shown:

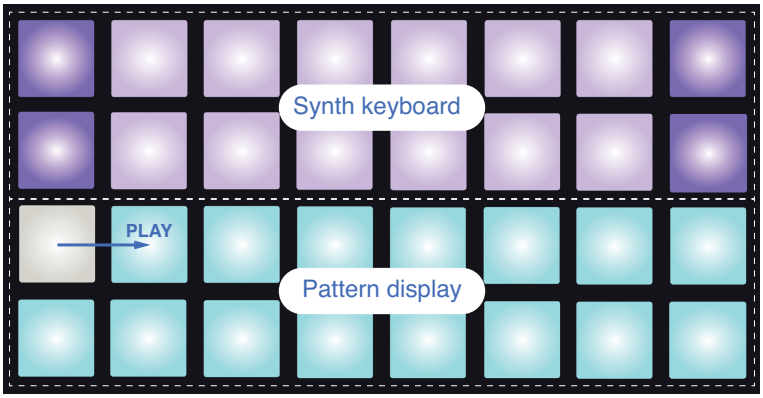


You can now add a snare drum to the sequence by pressing pads on the lower two rows. If you press **Drum 3** (or **Drum 4**), the sequence view for the other two drum tracks will be displayed, and you will find that you can add two other drum sounds at any step or steps in the sequence.

If you want to delete a drum hit, just press its pad again: you can do this while the sequence is playing or stopped. The brightly lit pads tell you where the hits are.

Now you can add synth notes. Press **Synth 1** to open ***Synth 1 View***. The top two rows represent a music keyboard, the lower two show you where you are in the sequence. When Play is pressed, you can see the white pad progressing through the steps.

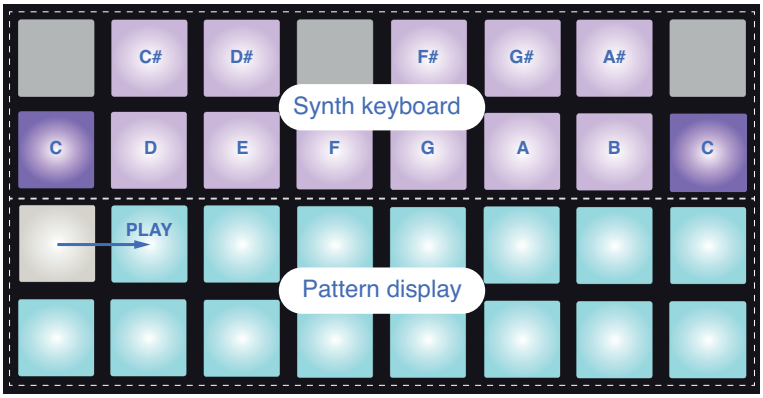
With all scales except Chromatic (see “Scales” on page 24), the grid display looks like this:



The “keyboard” is two octaves, with the mauve pads representing the lowest and highest notes in each. You can add synth notes in real time by just playing them, or you can add them to the pattern by pressing **Record** 12. While the Record button is lit, anything you play in either of the Synth Views (***Synth 1*** or ***Synth 2***) will become part of the pattern.

The **Oct** ▲ and **Oct** ▼ buttons alter the pitch range of the currently selected synth keyboard, by one octave each time they are pressed, up to a maximum of five octaves above or six octaves below the default octave. The lowest note in the default octave is ‘middle C’ on a standard piano keyboard.

For a conventional piano keyboard, press and hold **Scales** 8 and then press Pad 32 (the bottom right one), which will turn bright pink. This gives the keyboard Chromatic scaling, and the layout differs from that in the other scales:



Chromatic scaling offers all twelve notes in the octave; to accommodate them, the keyboard “size” is reduced to one octave.

THE SYNTHS

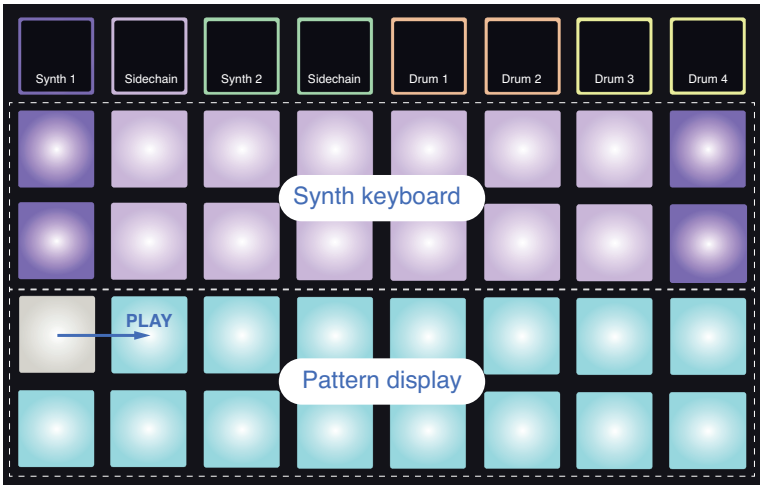
Each synth “engine” in Circuit is based on the powerful and versatile Novation MiniNova synth, albeit with fewer controls than the MiniNova offers. This section of the User Guide discusses the synth features in greater detail.

Playing a Synth

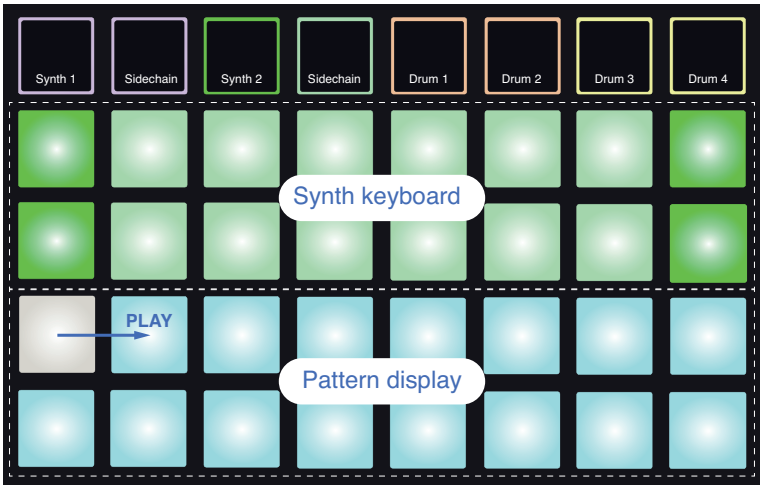
The two synth tracks – Synth 1 and Synth 2 operate identically. The only difference is in the RGB colour coding – Synth 1 keys are illuminated purple and Synth 2 keys are green; the high and low C notes in each octave show brighter than the intermediate keys in both cases. This colour coding is consistent in other Views.

To play a synth in real time, press the **Synth 1** or **Synth 2** track button 5 and then **Note** 6. This places the grid in ***Note View*** for the selected synth. **Note** will illuminate in purple or green according to which synth track is selected. The upper two rows of the grid constitute the synth keyboard, while the two lower rows show steps in the 16-note pattern. Note these are always illuminated pale blue, apart from the “current” step, which flashes white.

Synth 1 selected



Synth 2 selected



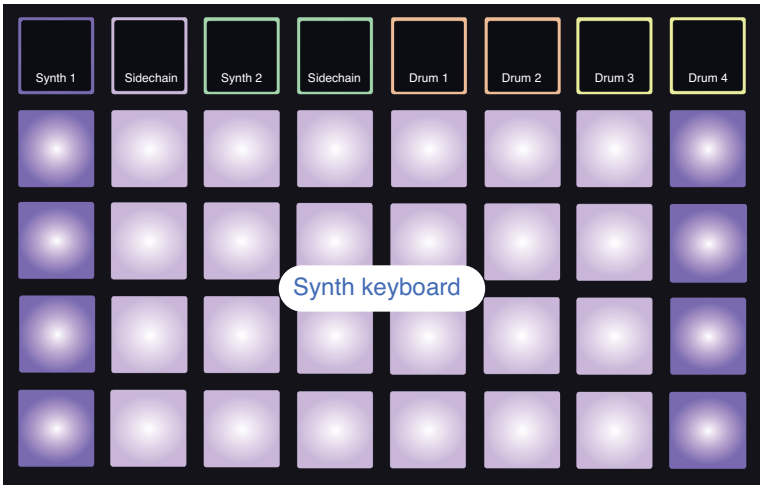
With the exception of the Chromatic scale (see Scales, page 24), the top row of the synth keyboard contains notes one octave above those in the second row. The highest note of the lower octave (Pad 16) is the always the same as the lowest note of the higher octave (Pad 1). Thus to play the notes over two octaves in ascending order, start with Pads 9 to 16, then 1 to 8.

When Circuit is powered up and an empty or new Session selected, Middle C will normally be the lowest note of the two octave keyboard (Pad 9). It is possible to alter the keyboard 'layout' so that the bottom note is something other than C – see page 24. The synth has a total range of 12 octaves; you can access higher or lower pairs of octaves by using the **Oct** ▼ and **Oct** ▲ buttons 13. Note that at the highest and lowest octave settings, the 'size' of the keyboard is limited.

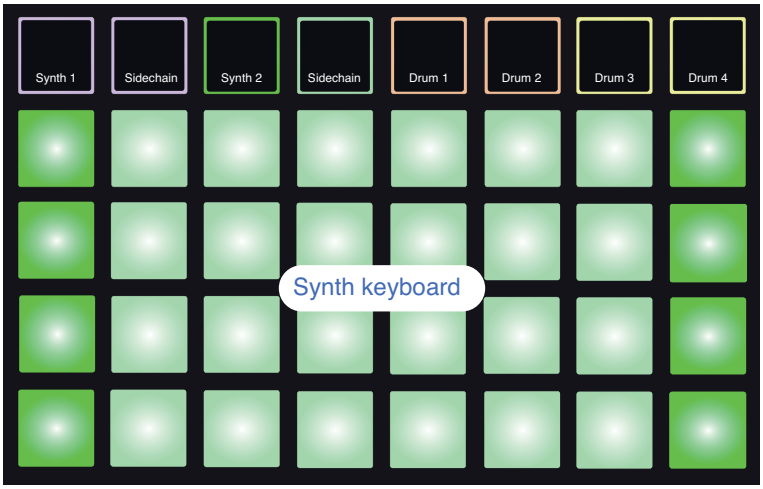
Expanded Note View

To obtain a keyboard with a wider range, hold down **Shift** 19 and press **Note** 6; **Note** now illuminates white. This is called ***Expanded Note View***, and removes the pattern display in the two lower rows of the grid, replacing it with keys for the next two lower octaves of the selected scale.

Synth 1 selected



Synth 2 selected



This View is very useful when recording synth notes in real time.

Expanded Note View can be cancelled by pressing **Note** again; the lower two rows of the grid now resume the pattern's step display.

Scales

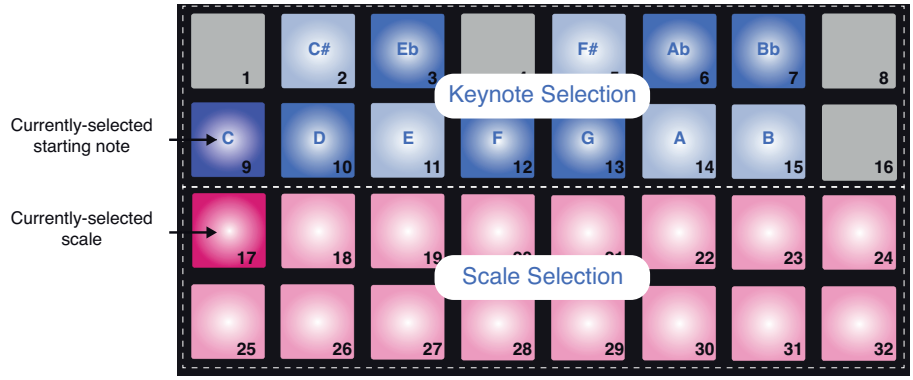
Circuit is extremely flexible in how it lets you configure the note pads in the playing grid to suit many musical genres in key or scale. There are two aspects to specifying how the note pads are laid out: the scale and the root note.

Up to 16 musical scales are available: these include those common in western musical styles such as major, natural minor, pentatonic and chromatic as well as more unusual scales (or modes) such as Dorian, Lydian and Mixolydian. Not all these scales contain eight notes, though the only one that has more than eight is Chromatic, with 12.

> You don't need to understand musical theory to make use of different scales. Because Circuit lets you alter the scale in use after you've created a pattern, it's easy to get an idea of their effect and their differences.
>
> Record a simple pattern of synth notes, and then play it back using different scales. You'll notice that with some scales certain notes shift up or down a semitone, and that this gives the "melody" you've composed quite distinct "moods" or "feels", some of which will be more suited to what you're trying to achieve than others.

Furthermore, although the default keyboard is based on a note of C (as described in the previous section), it is possible to redefine the lowest sounding note to be any note of the chosen scale.

Both scale and root note are set using the ***Scales View***, accessed by pressing the **Scales** button 8. The ***Scales View*** will look similar to that shown below:



Scale selection

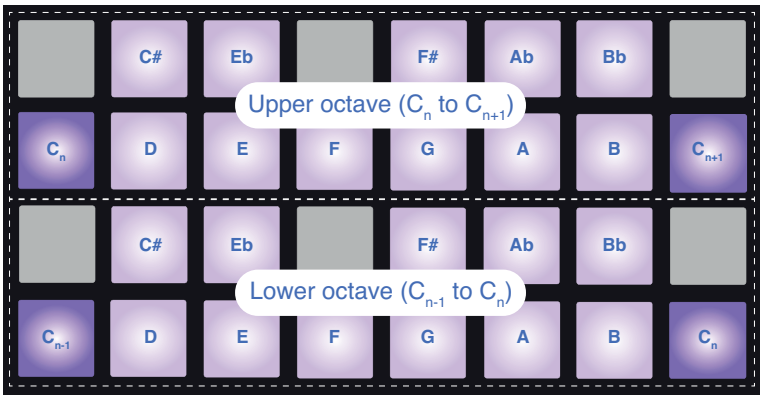
In ***Scales View***, the bottom two rows allow selection of one of the 16 available musical scales. These are listed in the table below, with the notes that each scale includes when the lowest note in the scale is C:

Pad	Scale	C	C#	D	Eb	E	F	F#	G	Ab	A	Bb	B
17	Natural Minor	✓		✓	✓		✓		✓	✓		✓	
18	Major	✓		✓		✓	✓		✓		✓		✓
19	Dorian	✓		✓	✓		✓		✓		✓	✓	
20	Phrygian	✓	✓		✓		✓		✓	✓		✓	
21	Mixolydian	✓		✓		✓	✓		✓		✓	✓	
22	Melodic Minor (ascending)	✓		✓	✓		✓		✓		✓		✓
23	Harmonic Minor	✓		✓	✓		✓		✓	✓			✓
24	Bebop Dorian	✓			✓	✓	✓		✓		✓	✓	
25	Blues	✓			✓		✓	✓	✓			✓	
26	Minor Pentatonic	✓			✓		✓	✓	✓			✓	
27	Hungarian Minor	✓		✓	✓			✓	✓	✓			✓
28	Ukranian Dorian	✓		✓	✓			✓	✓		✓	✓	
29	Marva	✓	✓			✓		✓	✓		✓		✓
30	Todi	✓	✓		✓			✓	✓	✓			✓
31	Whole Tone	✓		✓		✓		✓		✓		✓	
32	Chromatic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The scale you choose to play in will be saved when you save the pattern.

You will see that when you select a different scale in ***Scales View***, the illumination of the pads in the upper two rows changes. If you are familiar with a piano keyboard, you will see that the arrangement of pads simulates the layout of keys over one octave (initially starting at C), with Row 2 representing the white notes and Row 1 the black notes. Note that Pads 1, 4, 8 and 16 are always disabled in this view, to allow pads 2 and 3, and 5, 6 and 7 to act as the black notes. The brightly lit pads are those that belong to the selected scale, the dim ones are the notes that don’t belong.

When you exit ***Scales View*** by pressing **Note** again, the upper two rows in ***Note View*** now contain the notes in the selected scale, over two octaves. There is one exception to this – Chromatic scale. With this scale selected all 12 notes in the scale are available, which means that only a one-octave keyboard is possible to accommodate them. The upper two rows in ***Note View*** now have the same layout as in ***Scales View***. In ***Expanded Note View***, a two-octave keyboard is presented with Chromatic scale selected.

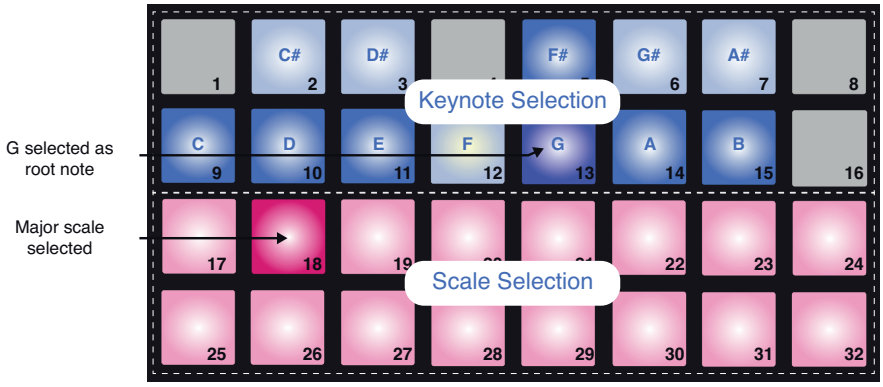


Chromatic Scale in Extended Note View

Root note

The default root note for all scales is C. In the ***Scales View*** shown at page 24, Pad 9, corresponding to C, is lit a darker blue than the other pads. To change the keyboard root note in ***Note View***, select a different note in ***Scale View***. (Note that the top two rows of Scales View *always* show an octave from C to B.) When a different root note is selected, the pad illumination changes to indicate the notes available in the currently selected scale for the new key.

For example, if you are working in the Major scale, and select G as the root note, the ***Scales View*** will look this:



The upper two rows now show the notes making up the G major scale: G, A, B, C, D, E, and F#.

In ***Note View***, each of the two upper rows (or each of all four rows in ***Expanded Note View***) will now sound the notes of the G major scale, running from G to G' (where G' denotes a note one octave above G). The same principle can be applied to re-scale the synth note pads in the ***Note Views*** to any desired root key.

If you have already created a pattern including synth notes, you can change the keynote to transpose the pattern, even while the pattern is playing. You can also change the scale itself for an existing pattern. In this case, some notes in the pattern as it was created may not exist in the new scale. In such a case, Circuit makes an intelligent decision as to which note to play instead, which will normally be either one semitone above or below the original note.

Selecting Patches

Each of the two synth tracks in your Circuit can use any one of 64 pre-loaded Patches (Presets). These Patches have been developed specifically for Circuit, and are listed on the Patch Sheet packed with the unit.

To change the Patch for Synth 1 or 2, hold down **Shift** 19 and press **Synth 1** or **Synth 2** 5 as appropriate. This opens the ***Patch View Page 1*** in the case of Synth 1 and ***Patch View Page 2*** in the case of Synth 2. **Synth 1** and Oct ▼ (or **Synth 2** and **Oct** ▲) will illuminate white and each of the pads in the grid represents 32 synth Patches: Patches 1 to 32 for Synth 1 and Patches 33 to 64 for Synth 2. To view the other page in the case of either synth, press the non-illuminated **Octave** button.

The pad corresponding to the currently selected Patch will be illuminated white and the others will be purple (Synth 1) or green (Synth 2). Patch 1 is the default Patch for Synth 1 and Patch 33 is the default Patch for Synth 2.

To select a different Patch, press its pad. The synth (1 or 2) will now adopt the sound defined by the new Patch. You can change Patch while a pattern is running, though the transition may not be absolutely smooth, depending on the point in the pattern when the pad is pressed. Changing the Patch of a saved pattern does not alter the Patch that was originally saved with the pattern, unless the session is re-saved.

Exploring the Macros

You can modify Circuit's synth sounds extensively with the Macro controls 3. Each of the 64 factory Patches available can have eight of its parameters "tweaked" in value to alter the sound. The audible effect of any adjustment will depend to a large degree on the Patch itself: on some Patches the effect of a given Macro control will be more obvious than on others.

By far the best way of understanding the effect of each Macro control is to load some different Patches, and experiment with the controls while listening. You will find that with certain Patches, turning some of the Macro controls will have an audibly different effect when other Macro controls have different settings. Try moving pairs of controls together to create unusual and interesting sonic variations.



If you're familiar with synth terminology, you may find it useful to know that, where possible, the assignment of the Macro controls broadly follows this scheme:

Macros 1 & 2 adjust Oscillator parameters
Macros 3 & 4 adjust Envelope parameters
Macros 5 & 6 adjust Filter parameters
Macros 7 & 8 adjust Modulation and FX parameters

However, it must be emphasised that numerous Patches will differ to a greater or lesser degree from these assignments, and that there is no substitute for experimentation!

Each Macro control has an RGB LED below the knob, which illuminates in either purple or green according to which synth is selected. The rotary controls are 'endless'; the LEDs therefore provide an indication of the parameter value, with the LEDs' brightness indicating the current value of the parameter as the knob is turned.

You can use the Macro controls while a pattern is playing to alter synth sounds in real time. If Circuit is in Record, the LEDs change to red as soon as the knob is turned, and parameter variations will now be recorded to the Session. See page 36 for more details.

Recording a synth pattern in real time

To record a synth pattern in real time, you will probably first want to record a drum track. Drum patterns are discussed in full detail in a later chapter, but a good starting point for a rhythm "bed" is to select **Drum 1**, and press Pads 1, 5, 9 and 13. Then when you press **Play**, you will hear a simple 4/4 bass drum. You can add some snare hits on or off the kick drum beat by pressing some pads on the lower two rows* (**Drum 2**), and you can also add some 1/8 or 1/16 hi-hat if you wish by selecting **Drum 3**, and entering some hits on the upper two rows of pads*.

Enter ***Note View*** for Synth 1 or Synth 2 (press **Note** and then **Synth 1** or **Synth 2** if not already selected) and run the pattern. If you want your synth notes to extend over four octaves rather

*Assuming that the factory default patches remain assigned.

than two (or two rather than one if you've selected Chromatic scale), select ***Expanded Note View*** instead (**Shift** + **Note**). You can "audition" the synth notes simply by playing them against the rhythm tracks a few times until you're happy – they won't be recorded until you press the **Record** button. When you're ready to save them to the pattern, press **Record** and carry on playing; after the pattern has completed 16 steps, the notes will be replayed. Circuit's synth engines are "six-note polyphonic" – that is, you can play up to six notes at once at any step in the pattern, if the Patch you've selected is suitably polyphonic.

While you're in Record, the step cursor (normally white) changes to red as it progresses through the pattern as an additional reminder that you are now about to alter the pattern.

Once you've played the required notes, press **Record** again to stop recording. You can also delete or add notes "manually" – that is, while the pattern isn't running. If you're working to a fast tempo, this is often easier. This topic is discussed in detail in the next section of the Guide.



The factory default Sessions load with monophonic sounds for Synth 1 and polyphonic sounds for Synth 2. This means you can easily use Synth 1 for a bass line, and Synth 2 for keyboard sounds. But you can, of course, change this at will.

Note that the two **Octave** buttons 13 have no effect on the pitch of the notes once they've been recorded; you need to decide which octave you're going to play in at the time of recording. However, you can still alter the octave of the pattern after recording by holding down **Shift** when pressing **Octave**.

The two parameters in ***Scales View*** – Scale and Root Note – can both be altered during playback as well, so if you like the pattern, but it's in the wrong key to fit with another musical element, you can just press **Scales** and select a different root note. The selected scale and root note apply to both Synth 1 and Synth 2.

Playing the same note in different octaves at the same step can add great depth and character to the sound. Circuit's six-note polyphony lets you play any six notes from each synth, and they don't all need to be in the same octave.

You can also experiment with different Patches once you've recorded a simple pattern. Enter ***Patch View*** while the pattern is playing (see "Selecting Patches" on page 27) and choose some different Patches; you'll hear their effect immediately.

Step editing

Step editing operations in Circuit may either be done with the pattern running (i.e., in Play mode) not running (i.e., in Stop mode).

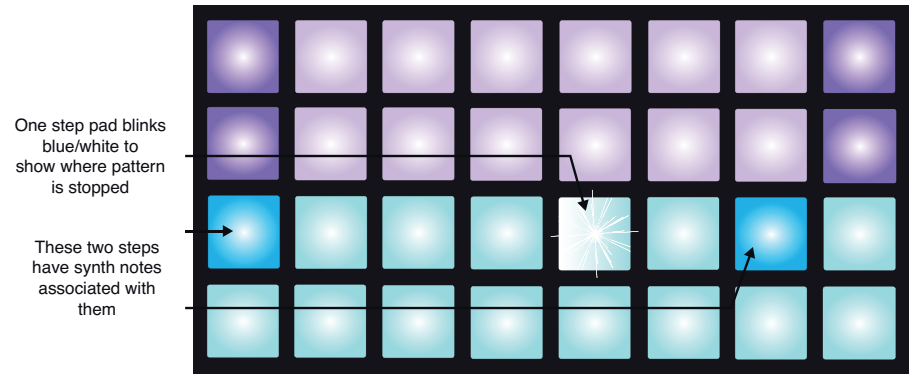
Circuit gives you the means of adding or deleting individual notes in a pattern without needing to worry about accurate timing, as editing is step-based and doesn't require the notes to be accurately entered.

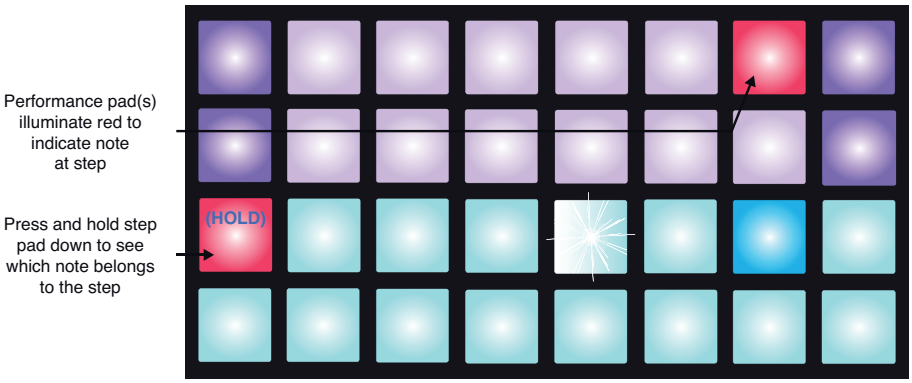
All the following details apply equally – and independently - to Synth 1 and Synth 2; press the **Synth 1** or **Synth 2** buttons to see the individual contributions of the two tracks to the overall pattern.

In ***Note View*** (note – not ***Expanded Note View***), the two lower rows of grid pads represent the 16-step pattern and the two upper rows are the performance pads. When a pattern is played, you can see the white pad moving through the 16 steps. When a step has a note associated with it, the performance pad in the two upper rows corresponding to the note being played illuminates white while the note is sounding (but see below regarding octaves).

When the pattern is not playing, you can listen to the notes assigned to each step and alter the pattern manually. When the pattern is playing, you will only hear the notes associated with each step when the sequence gets to the step. (But if you mute the synth track while the sequence is playing, you can press any of the illuminated pattern step pads to hear the note(s) assigned to a step.)

The pads for the steps which have notes associated with them will be illuminated bright blue. One step pad will flash white/blue: this shows where the pattern had reached when it was stopped. This is shown in the first diagram below. However, note that when you press **Play** again, the pattern will restart from Step 1.





If a bright blue step pad (i.e., one corresponding to a synth note) is pressed and held, it illuminates red, the note(s) at that step will sound, and the performance pad corresponding to the note(s) will also illuminate red (it will be two pads if it's the highest note in the lower octave or vice versa). This is illustrated in the second diagram above. The pads stay red and the note(s) sound(s) for as long as the step pad is held down.

The above description holds good as long as the currently selected octave is the same as that used to record the note. (Remember that although you can't change the octave of a note once it's been recorded, you can shift the octave of the performance pads up or down when a pattern isn't playing.) If you press a brightly-lit step pad but no performance pad illuminates red, it means that the note you are hearing – the one recorded for that step – lies in another octave. Use the **Oct** ▼ or **Oct** ▲ buttons 13 to move to another octave to find where the note is: a performance pad (or pads) will light red when you hit the right octave. You can hold the step pad down while pressing the **Octave** buttons to do this. With a bit of listening practice, you'll be able to guess the octave a note lies in relative to the one the performance pads are currently set to.

Deleting notes

If a note is incorrect, you can easily delete it by pressing the performance pad (showing red) while pressing the step pad. The performance pad will resume the colour of the other (unplayed) notes according to the synth being examined – purple or green.

Inserting notes

You can add synth notes to a pattern by selecting the step where the note is to go by holding down the pattern pad for that step, playing the required note(s) on the performance pad(s), and then releasing the pattern pad. You don't have to press **Record**. Now when you run the pattern, you will find that the note has been added.

Remember that you can add notes in any octave, but the octave you select will determine the octave displayed on the performance pads, so if all your existing notes are in the mid-range and you want to add a bass note, the performance pads will not display any of the higher notes once you've selected a lower octave.

Other note alterations

You can't change the note at a step to be a different note; you have to add the revised note first and then delete the original note. With a little practice, this will become an intuitive and very rapid process. The procedure needs to be done this way round to retain the Gate and Velocity values for the original note.

You can also alter the duration (Gate) and Velocity of individual notes. These topics are covered in a subsequent section of the Guide.

Clear and Duplicate

Clearing Steps

You can delete all assigned synth notes from a step in one go using the **Clear** button 16. This has the advantage that you don't have to search through several octaves to find all the notes assigned to the step.

Press and hold **Clear**; the button will illuminate bright red to confirm Clear Mode. Now press the step pad; it will turn red and all notes for the selected synth track at this step will be deleted. The step pad will revert to its dim "unassigned" illumination when this has been done. Release the **Clear** button to exit Clear Mode; its illumination will return to dim blue to confirm that the clear procedure is complete.

The Clear button has an additional function in both ***Patterns View*** and ***Sessions View***; see "Clearing Patterns" on page 46 and "Clearing Sessions" on page 59.

Duplicating Steps

The **Duplicate** button 17 performs actions very similar to "copy-and-paste".

In ***Note View*** for either of the synth tracks, you can use **Duplicate** to copy all the synth notes at a step, and their various attributes, to a different step in the pattern.

To copy synth data from one step to another, press and hold **Duplicate**: it will illuminate bright green. Press the pad in the two lower rows corresponding to the step to be copied (the 'source' step); it will illuminate green. Now press the pad corresponding to the step where the data is to be copied to (the 'destination' step); this will give a single red blink. All the note information in the source step will now have been duplicated in the destination. Any pre-existing note information in the destination step will be overwritten. Upon release, the **Duplicate** button will return to dim blue to indicate that the duplication procedure is complete. If you want to copy the note data to several steps, you can continue to hold the **Duplicate** button down, and simply repeat the "paste" part of the operation to the other steps.

Velocity and Gate

Every step in a pattern has two further parameters that are available to you to adjust. These are Velocity, which determines how the volume of a note is related to how hard the pad is struck, and Gate, which sets the duration of the note. The Velocity and Gate values of each step will apply to every note assigned to that step.

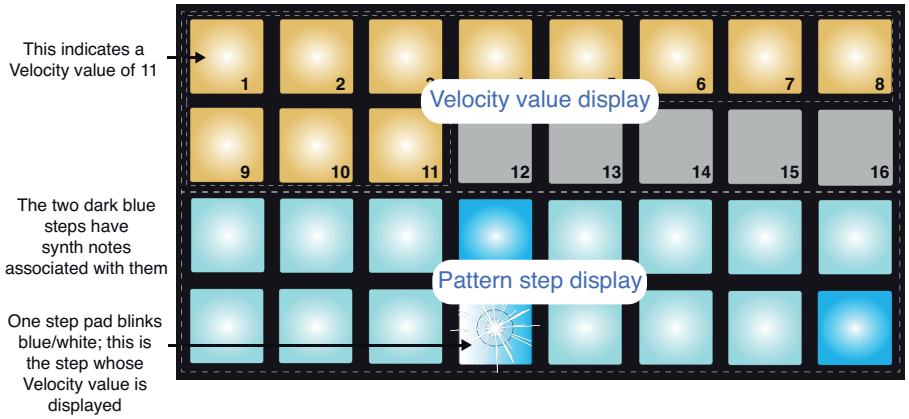
Velocity

The velocity parameter determines the relationship between the speed of movement and the volume of the note. A high value for Velocity means that the note will be loud; a low value means that the note will be lower in volume.

Velocity values are assigned to each step as you play the performance pads.

Velocity values are per-step, not per-note: all notes at a step will have the same Velocity value.

You can set the Velocity parameter for each step Circuit lets you change the Velocity value of a step to any of 16 values, after you've created a pattern. This is done in ***Velocity View***, which is selected by pressing **Velocity** 6, which illuminates sand (off white).



In ***Velocity View***, the two lower rows of the grid represent the pattern steps. In the 16-step example shown above, Steps 4, 12 and 16 are brightly lit, indicating that these steps have notes associated with them. One pad in the Pattern step display will flash alternate white/blue: this is the step whose Velocity value is being displayed.

The two upper rows of the grid make up a 16-segment "bargraph" meter; the number of pads illuminated white is the Velocity value for the selected step. In the example shown, the displayed Velocity value is 11 (equivalent to an actual Velocity value of 88 – see following page): the remainder of the Velocity value display is unlit.

If you record in real time – i.e., while the sequencer is running and recording – the velocity value is set internally to 7-bit accuracy: a value between 0 and 127. However, ***Velocity View*** can only display the Velocity value to a resolution of 16 increments of 8 value steps each (because there are only 16 pads available). This means that you are likely to see the "last" pad in the display lit at a lower brightness. For example, if the Velocity value is 100, you will see Pads 1 to 12 fully lit and Pad 13 dimly lit, because the value of 100 lies midway between two multiples of eight. The table below shows the relationship between actual Velocity values and the pad display:

No. of lit pads	Velocity value	No. of lit pads	Velocity value
1	8	9	72
2	16	10	80
3	24	11	88
4	32	12	96
5	40	13	104
6	48	14	112
7	56	15	120
8	64	16	127

You can change Velocity value by pressing the pad in the Velocity value display rows that corresponds to the Velocity value. If you wanted the note(s) at Step 12 in the example above to have a Velocity value of 48 instead of 88, you would press pad 6; Pads 1 to 6 now illuminate white. If you want to increase a Velocity value, press the pad corresponding to the required value.

You can also use ***Velocity View*** to change Velocity values while a pattern is playing. In this case, you need to press and hold the pad for the step to have its Velocity value changed; you can do this at any point in the pattern. The held step pad will illuminate red, and the two upper rows will "freeze" to display the Velocity value of the selected step. Press the Velocity pad corresponding to the new value required. The pattern continues to play, so you can experiment with different Velocity values in real time and hear the differences.

Fixed Velocity

You may sometimes prefer to disable Velocity; then the notes comprising your synth sequence will have a more “mechanical” feel to them regardless of how you hard you actually strike the pads. Circuit has a Fixed Velocity function, which sets Velocity at a value of 96.

Fixed Velocity is enabled by pressing **Velocity** 6 while holding down **Shift** 19. Fixed Velocity is confirmed by the **Velocity** button illuminating bright white while **Shift** is pressed.

You will now find that all the synth notes that you have just played have a Velocity value of 96 (12 pads lit).

Note that setting Velocity to Fixed does not alter the Velocity values of notes previously recorded.

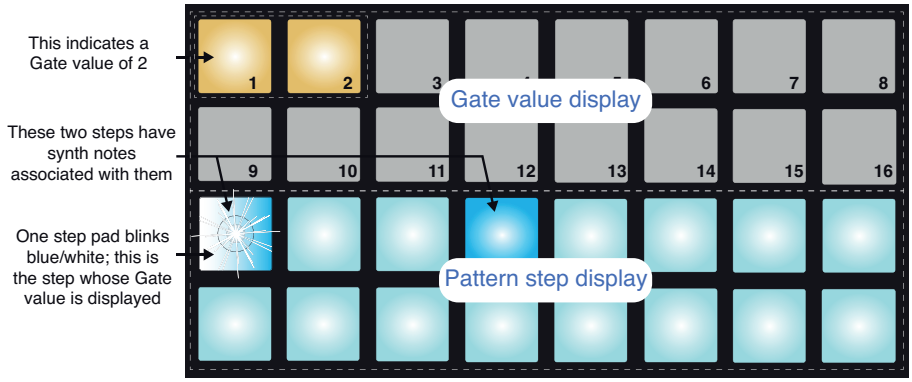
Gate

Gate is essentially the duration of the note at a step. The Gate value is a number from 1 to 16, and the number represents the time – in the number of steps - for which the notes at the step will sound.

Gate values are assigned to each note as you play the performance pads; Circuit quantizes them to the nearest whole number of steps. A short stab at a performance pad will likely result in a Gate value of 1; if you hold a pad down for longer, the Gate value will be higher. A Gate value of 16 means that notes at that step will sound continuously for the entire pattern.

Although Gate values are assigned to individual notes as the synth is played, editing the Gate value causes all the notes at a step to assume the same value: i.e., all notes at a step will then sound for the same duration.

Circuit lets you change the Gate value of a step after you’ve created a pattern. This is done in ***Gate View***, which is selected by pressing **Gate** 6.



In ***Gate View***, the two lower rows of the grid represent the pattern steps. In the 16-step example shown above, Steps 1 and 4 are brightly lit, indicating that these steps have notes associated with them. One pad in the Pattern step display will flash alternate white/blue: this is the step whose Gate value is being displayed.

The two upper rows of the grid make up a 16-segment “bargraph” meter; the number of pads illuminated white is the Gate value for the selected step. In the example shown, the Gate value is 2: the remainder of the Gate value display is unlit.

You can change Gate value by pressing the pad in the Gate value display rows that corresponds to the Gate value; that is, the number of pattern steps that the note(s) at the step should sound for. If you wanted the note(s) at Step 1 in the example above to sound for four steps instead of two, you would press pad 4; Pads 1 to 4 now illuminate white. If you want to shorten a Gate value, press the pad corresponding to the required value. The rule is: press the pad corresponding to the actual number of steps that the note(s) should sound for.

You can also use ***Gate View*** to change Gate values while a pattern is playing. In this case, you need to press and hold the pad for the step to have its Gate value changed; you can do this at any point in the pattern. The held step pad will illuminate red, and the two upper rows of Gate View will "freeze" to display the Gate value of the selected step. Press the pad corresponding to the new value required. The pattern continues to play, so you can experiment with different Gate values in real time.

Pattern steps with no notes have a zero Gate value; all Gate pads in ***Gate View*** for such steps will be unlit. You can't edit a step's Gate Value if there are no notes assigned to that step.

Recording Knob Movements

You can tweak the synth sounds in real time using any of the eight Macro controls 3. Circuit features Dynamic Automation, which means you can add the effect of these tweaks to the recorded pattern by putting Circuit into Record Mode (by pressing **Record** 12) while moving the knobs.

When you have entered Record Mode, the LEDs below the Macro controls initially retain the colour and brightness they had previously, but as soon as you make an adjustment, the LED turns red to confirm that you are now recording the knob movement.

In order for the knob movements to be replayed, you must drop out of Record Mode before the sequence loops right round, otherwise Circuit will overwrite the automation data with that corresponding to the new knob position. Provided you do this, you'll hear the effect of the Macro control being replayed when the sequence next loops round, at the point in the pattern where you turned the control.

You can also record Macro control changes when the sequence isn't playing; in ***Note View***, press **Record**, select the step at which the change should occur by pressing and holding the pad corresponding to the step; this will play the synth note(s) at that step. Then rotate the Macro controls; the new value will be written to the automation data, and press **Record** again. When the sequence is running, you will hear the effect of the Macro knob movements at that step.

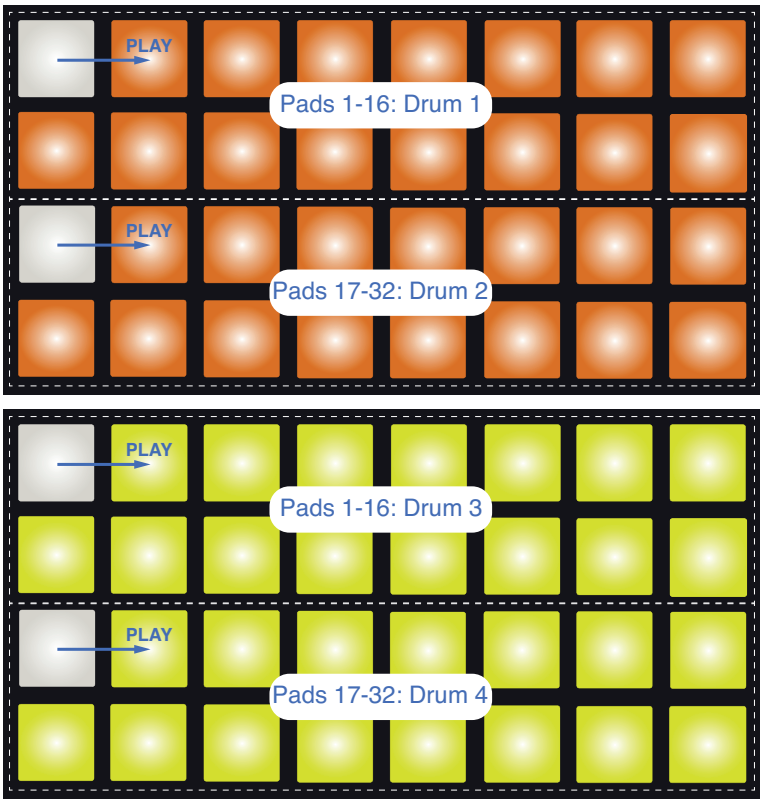
You can delete any Macro automation data you don't want to keep by holding down **Clear** and moving the knob in question by at least 20% of its rotation – the LED below the knob will turn red to confirm. But note this will clear the automation data for that Macro for the whole Pattern, not just at the sequencer's current step.

THE DRUMS

Circuit has four separate drum tracks, Drum 1 to Drum 4. The grid displays for the drum tracks differ from those for the synth tracks in that the drums data is presented in odd/even pairs, and also, all of the display shows the pattern steps, there being no pitch information to display as with the synths.

Playing Drums

The two pairs of drums operate identically apart from the RGB colour coding. Drum 1 and Drum 2 are displayed as a pair, in orange, while Drum 3 and Drum 4 are yellow. If you press either **Drum 1** or **Drum 2** [8] in Note View, you'll get the displays for both drum tracks, with Drum 1 being displayed on the two upper rows and Drum 2 on the two lower. Drums 3 and 4 operate in the same way.



In certain other views however, the whole 32-pad grid is devoted to one of the four drums.

In ***Note View***, the 16 pads for each drum are the pattern steps. When you press any of Pads 1 to 16, you are assigning one hit of the drum sound currently selected for the drum track to that pattern step. So, if you press Pad 4 in ***Note View*** for Drums 1/2 and press **Play**, you'll hear the drum sound which is currently assigned to Drum 1 at step 4 of the pattern. Similarly, if you press pads 17, 19, 21 and 23 in ***Note View*** for Drums 3/4, you'll hear the drum sound that's currently assigned to Drum 4 at steps 1, 3, 5 and 7 of the pattern.

Note that pads illuminate brightly once they've been pressed – this is to show you where the hits for each drum occur in the pattern. As with the ***Note View*** for the Synth tracks, the current step is indicated by one white pad, which moves through the 16-step pattern when you press **Play**.

Expand View

You can enter a drum pattern “manually” on a dedicated set of four pads – one for each drum – by using ***Expand View***. Hold down **Shift** 19 and press **Note** 6. This disables all the grid pads except 29-32, as shown:

All drums active



Playing Pads for Drums 1-4

The drum sound generated by each of the four playing pads is the one that is currently assigned. See “Selecting Patches” on page 27 for how to how change these.

You can play the drum pads in ***Expanded Note View*** freely in real time, or record them into a pattern if you press **Record**. Circuit will quantize the timing to make the drum hits fit the 16-step pattern. You can also use ***Expanded Note View*** while a pre-existing pattern is playing, to record additional hits.

Selecting Patches

Each of the four drum tracks in your Circuit can use any one of 64 pre-loaded Patches (Presets).

To change the Patch for any of the drum tracks, hold down **Shift** 19 and press **Drum 1**, **Drum 2**, **Drum 3** or **Drum 4** 5 as appropriate. This opens the ***Patch View Page 1*** in the case of Drums 1 or 2, and ***Patch View Page 2*** in the case of Drums 3 or 4.

Drum 1 or **2** and **Oct** ▼ (or **Drum 3** or **4** and **Oct** ▲) will illuminate white and each of the pads in the grid represent 32 drum Patches: Patches 1 to 32 for Drums 1 or 2 and Patches 33 to 64 for Drums 3 or 4. Whichever drum track you’re working on, press the non-illuminated **Octave** button to view the other page.

The grid pad corresponding to the currently selected Patch will be illuminated white and the others will be orange (Drums 1 and 2) or yellow (Drums 3 and 4). The default Drum Patches are summarised in the table below:

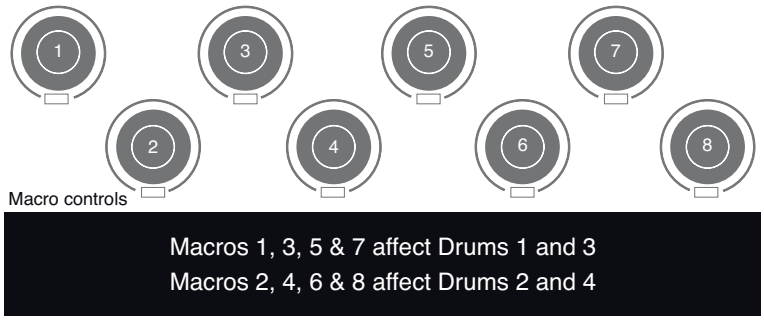
Drum	Patch No.	Page No.		Patch
1	1	1	Default page for Drums 1 & 2	Kick
2	17	1		Snare
3	33	2	Default page for Drums 3 & 4	Hi-hat (closed)
4	37	2		Hi-hat (open)

To select a different Patch, press its pad. The selected drum track (1 to 4) will now adopt the sound defined by the new Patch. You can change Patch while a pattern is running, though the transition may not be absolutely smooth, depending on the point in the pattern when the pad is pressed. Changing the Patch of a saved pattern does not alter the Patch that was originally saved with the pattern, unless the session is re-saved.

Using the Macros for drum design

You can use the Macro controls 3 to tweak drum sounds in the same way as you can with synth sounds. Unlike the synth Macros, the functions are fixed for drums, but the actual sonic nature of moving the knobs will vary greatly with the drum Patch being used. As with the synth sounds, we recommend that you load different drum sounds and experiment with the Macros to hear what they can do.

Because the drum tracks are arranged in pairs, the odd-numbered Macro controls affect the odd-numbered tracks (i.e., Drum 1 or Drum 3) and the even-numbered controls affect Drums 2 or 4.



The table below summarises the functions of each Macro control as applied to the drum tracks:

Macro	Drums	Function
1	1 or 3	Static pitch
2	2 or 4	
3	1 or 3	Decay envelope time
4	2 or 4	
5	1 or 3	Distortion
6	2 of 4	
7	1 or 3	Filter
8	2 or 4	

Recording a Drum Pattern

Creating a drum pattern is a slightly different procedure from creating a synth pattern. When you're in ***Note View*** for any of the drum tracks, just hitting the performance pads establishes drum hits at those steps in the Pattern.

However, another difference from the synth tracks is that the Pattern must be running (press **Play**) in order for you to hear the hits; you won't hear anything in ***Note View*** if you hit the pads with the Pattern stopped. (However, you can hear the hits in ***Velocity View*** – see "Velocity" on page 41.)

A 16-step drum Pattern is created simply by pressing **Play** and hitting some pads. (You can create longer sequences by chaining Patterns together, see "Chaining Patterns" on page 50.) You can switch between Drums 1 and 2 and Drums 3 and 4. It's not a bad idea to establish a basic drum Pattern using the default drum sounds (kick, snare and two different hi-hats); once you think you're getting somewhere with the groove, you can experiment with different drum sounds by going to ***Patch View*** and/or using the Macros.

The Pattern you make will constitute Pattern 1 (of 8) for the currently active Session. There are eight Patterns for each of Circuit's four tracks – two synths and two drums. Pattern 1 is the default Pattern in all Sessions, and will be the one you record to and the one you'll hear when you hit Play.

Manual hit entry and step editing

Although you can't hear the drum hits in ***Note View*** when the Pattern isn't running (i.e., Circuit is not in Play mode), Circuit lets you add or delete individual drum hits to/from a Pattern, effectively "off-line".

All the following details apply equally – and independently - to Drums 1 and 2, and Drums 3 and 4; press the **Drum 1** (or **Drum 2**) or **Drum 3** (or **Drum 4**) buttons to see the individual contributions of the four drum tracks to the overall pattern.

In ***Note View***, the two pairs of grid pad rows (upper and lower) represent the 16-step pattern; all the pads are performance pads. When a pattern is played, you can see the two white pads – one for each visible drum track - moving through the 16 steps.

In both Stop and Play modes, you can see which steps have the hits in each drum track because the pads for those steps are brightly lit.

You can alter the pattern manually in Stop mode. To add additional hits, simply press the (dimly lit) pad at the desired step. To delete a hit, press the bright pad at the step; its illumination will dim.

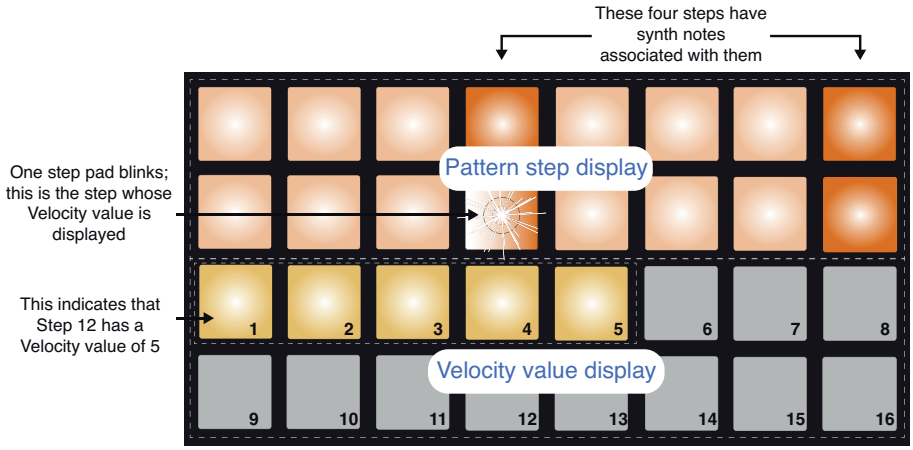
Other drum hit alterations

You can also alter the Velocity of individual hits. This topic is covered in the next section.

Velocity

Drum hits entered in ***Note View*** will always have a fixed velocity of 96 (12 pads lit in ***Velocity View***). Drum hits entered in ***Expand View*** (i.e., using the four tap pads) will have velocity values determined by how hard the pads are struck.

Circuit lets you change the Velocity value of a step after you've created a pattern. This is done in ***Velocity View***, which is selected by pressing **Velocity** 6. ***Velocity Views*** for the drums differ from those for the synths due to the pairing of the drum tracks.



In ***Velocity View***, the two upper rows of the grid represent the 16-step pattern for Drum 1 or Drum 3, while the two upper rows make up a 16-segment “bargraph” meter; the number of pads illuminated “sand” (off white) represent the Velocity value for the selected step. If Drum 2 or Drum 4 is selected, the pairs of rows are reversed, with the velocity meter above the steps.

In the example shown on the previous page (which would be for Drum 1 or 3), Steps 4, 12 and 16 are brightly lit, indicating that these steps have notes associated with them. One pad in the Pattern step display will flash alternate white/orange: this is the step whose Velocity value is being displayed. The Velocity value for this step is 40; the first five pads of Row 3 are lit sand (because 5 x 8 = 40), the remainder of the Velocity value display is unlit. If the Velocity value is not a multiple of 8, the “last” pad in the Velocity display will be dimly lit. Note also that you hear the drum hit at the step when you press the step pad.

You can change Velocity value by pressing the pad in the Velocity value display rows that corresponds to the Velocity value. If you wanted the hit at Step 12 in the example above to have a Velocity value of 96 instead of 40, you would press pad 12; Pads 1 to 12 now illuminate sand. If you want to decrease a Velocity value, press the pad corresponding to the required value.

You can also use ***Velocity View*** to change Velocity values while a pattern is playing. In this case, you need to press and hold the pad for the step to have its Velocity value changed; you can do this at any point in the pattern. The held step pad will illuminate red, and the other two rows will “freeze” to display the Velocity value of the selected step. Press the pad corresponding to the new value required. The pattern continues to play, so you can experiment with different Velocity values in real time.



Velocity View can also be used to enter drum hits. Hold down the pad corresponding to the step where a hit is to be added, and press a pad on the two upper rows; the pad defines the velocity of that note. This is great for adding a series of “ghost” hits at low volume.

Fixed Velocity

If you’re entering hits on the four performance pads in ***Expand View***, you may prefer to disable Velocity; then the hits comprising your drum pattern will all be at the same volume. Circuit has a Fixed Velocity function, which sets Velocity at value of 96 (pad display12).

Fixed Velocity is enabled by pressing **Velocity** 6 while holding down **Shift** 19. Fixed Velocity is confirmed by the **Velocity** button illuminating white while **Shift** is held down.

You will now find that all the drum hits you enter have a Velocity value of 96 (pad display 12). You can still change this to another value if you want by following the procedure described above.

Recording Knob Movements

As with synth sounds, you can tweak drum sounds in real time using the eight Macro controls 3. Circuit features Dynamic Automation, which means you can add the effect of these tweaks to the recorded pattern by putting Circuit into Record Mode (by pressing **Record** 12) while moving the knobs.

When you have entered Record Mode, the LEDs below the Macro controls initially retain the colour and brightness they had previously, but as soon as you make an adjustment, the LED turns red to confirm that you are now recording the knob movement.

In order for the knob movements to be replayed, you must drop out of Record Mode before the sequence loops right round, otherwise Circuit will overwrite the automation data with that corresponding to the new knob position. Provided you do this, you'll hear the effect of the Macro control being replayed when the sequence next loops round, at the point in the pattern where you turned the control.

You can also add Macro automation to specific drum hits while the sequencer is not running (i.e., with Circuit in Stop Mode). Because ***Note View*** for the drum tracks doesn't include a separate display of the step pattern as it does with the synth tracks, you will need to select ***Velocity View*** by pressing **Velocity** 6. Press the **Record** button 12 (it will illuminate bright red) and select the drum hit that you want to alter the sound of. You'll hear the currently assigned drum sound and the pad will alternately blink the track colour (orange or green) and red. Move the Macro control(s) for the drum track you're working on as required; the Macro LED will change from the track colour to red. You can keep playing the drum hit by pressing its pad repeatedly while doing this. When you're happy, exit Record Mode.

Because the drum sounds are always affected by the Macro control settings, you will now find that all the drum hits on the track (assuming there are more than one) have assumed the revised sound. If you only want a single hit to have the revised sound, repeat the process described above, but this time select one of the other steps with a hit, and reset the Macro controls to give you the original sound back. Exit Record Mode. You will now find that only the hit you altered the sound of the first time is different; all the other hits will assume the Macro's new setting when you run the sequence.

You can delete any Macro automation data you don't want to keep by holding down **Clear** and moving the knob in question by at least 20% of its rotation – the LED below the knob will turn red to confirm. But note this will clear the automation data for that Macro for the whole Pattern, not just at the sequencer's current step.

Clear and Duplicate

The **Clear** and **Duplicate** buttons perform the same functions with drum tracks as they do with synth notes (see “Clear and Duplicate” on page 32), although as altering a drum pattern is such a simple process to perform in ***Note View***, you probably won’t ever use them to simply add or remove drum hits.

However, there is one important point to note – using **Clear** and **Duplicate** will also remove or copy any automation data (Macro knob movements) associated with the step. If you use the Duplicate function to copy a drum hit from one step to another any modification to the drum sound effected by the automation will be copied to the new step. Similarly, if you just delete a drum hit from a step, any automation data for that step remains in place and will affect a new drum hit recorded at that step. Using the Clear function deletes the automation data as well, so that a drum hit added subsequently will have the “native” sound.

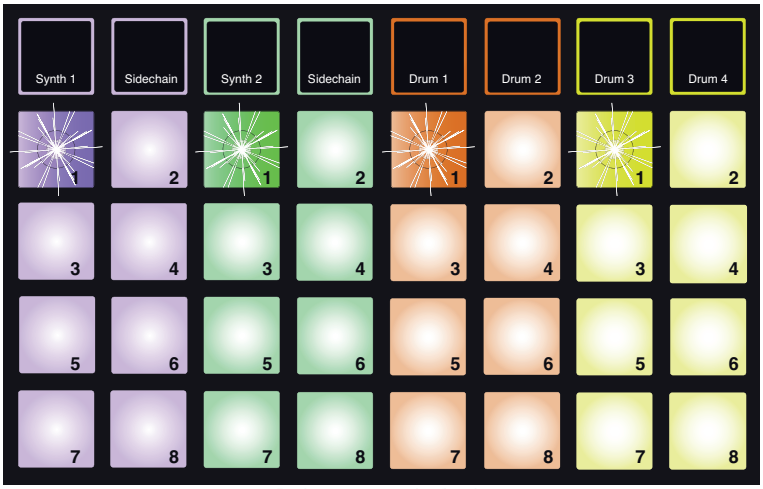
PATTERNS

Each Session in Circuit has memory space for eight separate Patterns per track, so you can create eight Synth 1 Patterns, eight Synth 2 Patterns, eight Drum 1+2 Patterns and eight Drum 3+4 Patterns within a Session.

The true potential of Circuit begins to be realised when you start to create interesting variations of a pattern, save them, and then chain them together to be played out as complete sequences of up to 128 (8 x 16) steps. Furthermore, not all the Patterns for each track need to be chained in the same way: you could have 32-step drum patterns for each pair of drum tracks combined with a longer sequence of bass and/or synth lines, for example. There is no restriction on how you combine the patterns from different tracks (though there is a restriction on how the Patterns for individual tracks are chained; this is explained in “Chaining Patterns” on page 50).

Patterns View

To see how your Patterns are arranged and currently selected, you use ***Patterns View***, accessed by pressing **Patterns** [9]. The first time you open Patterns View in a new Session, it will probably look like this:



Pads #1 pulsing dim/bright

The grid is divided vertically into 8 (2 x 4) pads per track. As with most of Circuit’s other views, the drum tracks are pairs of drums: each of the Pattern memories for Drum 1/Drum 2 can contain an 16-step pattern made up of hits recorded on BOTH Drum 1 and Drum 2.

The Pattern memories for each track are numbered 1 to 8 as shown. How each pad is lit indicates its status. A dim pad means that the Pattern is not currently selected. One pad per track will be pulsing slowly between dim and bright: this is the Pattern that was playing when Play was last stopped. Initially (i.e., when a new Session is started), Pattern 1 in each track will be in this state with all the other memories empty (and the pads consequently dimly lit).

To select a different Pattern for any track, simply press its pad. You can do this in Stop or Play Modes; an important feature of the pattern sequencing is that if you select a Pattern while

another is already playing, the first will play to the end of the Pattern before the new Pattern starts playing. This gives you a smooth transition between patterns. In this case, the pad for the newly selected track will flash quickly while it is being “queued”, until it starts to play.

The currently selected Pattern is the one used in both Play and Record Modes: this makes operation very simple and transparent. The current contents of the selected Pattern (if any) will play when you press **Play**, and if you add extra hits (on a drum track) or notes (on a Synth track, but you have to press the **Record** button as well in this case), they will be saved in the same Pattern.

Every time you press **Play**, the Pattern restarts from Step 1. You can restart the Pattern from the point at which the sequencer was stopped by pressing **Shift** and **Play** together.

Clearing Patterns

Pattern memories may be cleared in ***Patterns View*** by holding down **Clear** 16 and pressing the pad for the Pattern to be cleared. Both **Clear** and the pad itself will light bright red while you press them to confirm deletion.

Duplicating Patterns

In ***Patterns View***, the **Duplicate** button 17 can be used to perform a simple copy-and-paste function, letting you copy a Pattern from one memory to another. This is a very useful function, as it lets you use an existing 16-step pattern as the basis for another, slightly different one: it is often easier to modify an existing Pattern to be how you want it than create a new one from scratch.

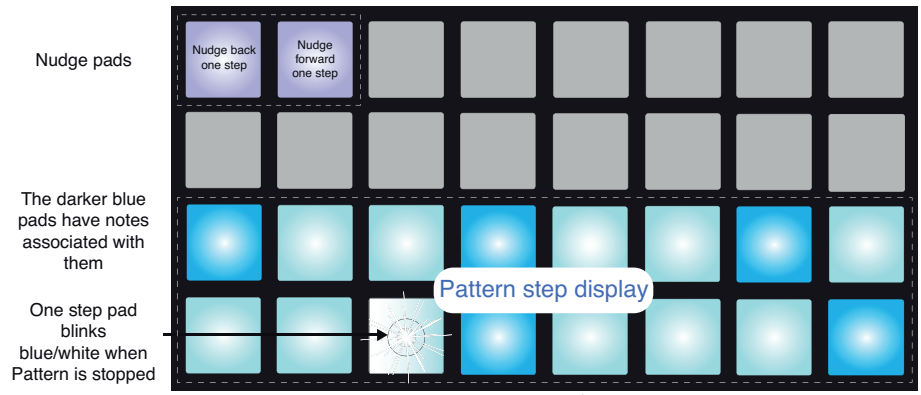
To copy a Pattern, hold down **Duplicate** (it lights bright green), press the pad with the Pattern you want to copy (it lights green while you press it), and then press the pad corresponding to the memory that should contain the copy (it will light red). You now have a duplicate of the Pattern in the first memory in the second. If you want to copy the Pattern data to several memories, you can continue to hold the Duplicate button down, and simply repeat the “paste” part of the operation to the other steps.

> **IMPORTANT**
> You can copy a Pattern from one Synth track to the other, and a Pattern from one Drum Pair track to the other, but you *cannot* copy data from a Synth track to a Drum Pair track, or vice-versa.

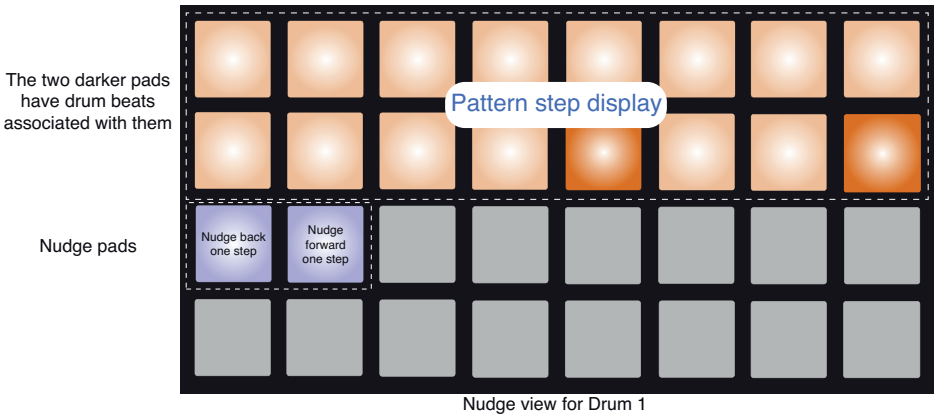
Nudge

Circuit's Nudge function is all about per-track timing adjustments. It lets you move the notes of a synth track or hits of a drum track backwards or forwards in time, in one-step increments, relative to the other tracks making up the Session. It's useful to correct notes or hits that you didn't manage to enter exactly on time, and can also be used creatively to move synth or drum phrases against the rest of the Pattern by any number of steps you wish.

To make these timing adjustments, you use ***Nudge View***, entered by pressing **Nudge** 7. ***Nudge Views*** for synth and drum tracks are slightly different because of the pairing of drum tracks; this is the same principle that you've already seen in ***Velocity View***. The ***Nudge Views*** for both synth tracks and also for Drums 2 and 4 place the step pattern display on the two lower rows of the grid, while the ***Nudge Views*** for Drums 1 and 3 place the step pattern display on the two upper rows of the grid.



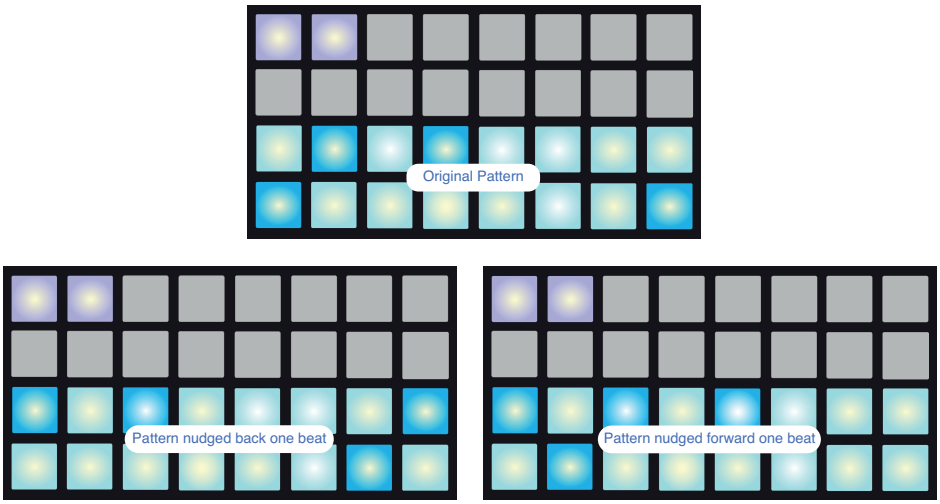
Nudge view for Synths



Nudge view for Drum 1

In either case, two pads are lit dimly blue; the left pad retards the selected pattern by one step each time it is pressed, the right pad advances it. The Nudge pads light white as they are pressed.

The grids below (Synths used as the example) show the effect of retarding and advancing a Pattern by one step using Nudge:



Length

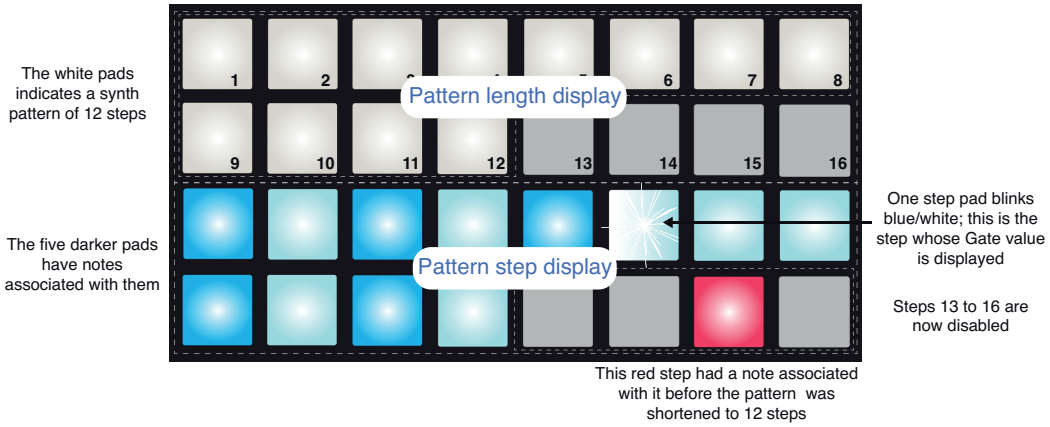
The number of drum steps (on the four drum tracks) in a Pattern is always 16, but the Patterns on the synth tracks can have any number of steps between 1 and 16. The default number of steps in the synth Patterns is 16, however. This, for example, lets you set an 8-step or 12-step synth or bass phrase against the 16-step drum Patterns, which can add some interesting and unusual timing variations to your Session.

To reduce the synth pattern length from 16, press **Length** 7 to enter ***Length View***. Because Length is only applicable to the synth tracks, you can only select this View if Synth 1 or Synth 2 is selected; the **Length** button is disabled when a drum track is selected. As with most of Circuit's other modification views, you can use ***Length View*** either with the pattern running or stopped.

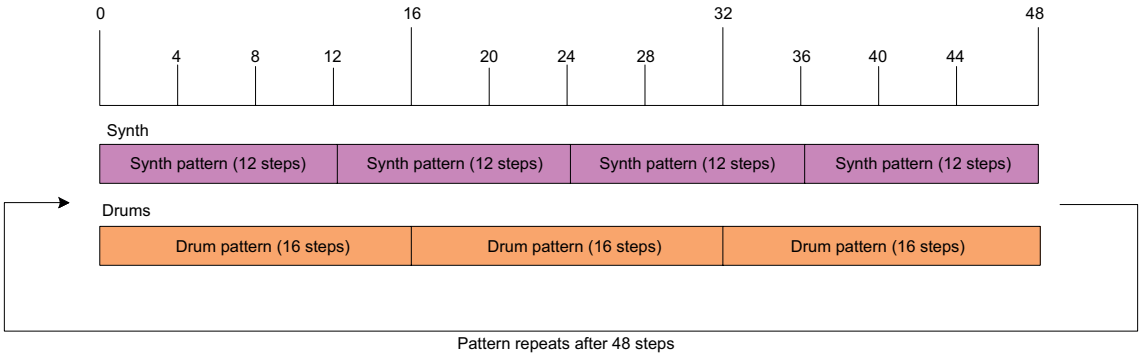
Length View is similar in principle to ***Gate View*** (see "Gate" on page 35). The two lower rows display the step pattern, while the two upper rows indicate the length of the synth pattern in steps – initially all 16 pads will be lit sand because the default pattern length is 16.

In the step pattern display, pads will be brightly illuminated if there are synth notes at that step, and dim if not. One pad will flash blue/white to indicate the current position of the pattern cursor

To reduce the synth pattern length to, say, 12 steps, press pad 12; the LEDs in pads 13 to 16 will go out. In the lower two rows, the last four pads will also change their indication: if any of Steps 13 to 16 have notes assigned to them, the relevant pads will glow dim red. If there are no notes assigned to them, the pads will go dark.



When this pattern plays it will now only be 12 steps long; any notes that were associated with Steps 13 to 16 will not be played, and the pattern will restart at Step 1 after Step 12. The drum tracks will continue to play the 16-step pattern that has been assigned to them, so the effect will be that step 1 of the synth pattern will occur at a different point relative to the drum track on three successive drum patterns, as illustrated below:



Thus the pattern will repeat in full every 48 steps, because 3 x 16 = 48 and 4 x 12 = 48; you'll hear four repetitions of the 12-step synth pattern for every three repetitions of the 16-step drum pattern. This is a simple example, and obviously if you enter other lengths – particularly odd numbers! – you'll find patterns that take a long time before they repeat. And it gets more interesting still when your patterns are part of a chained sequence.

Combining Nudge and Length adjustments

Nudge and Length make separate adjustments to the pattern, and may be used independently. However, the effect of Nudge on shortened Pattern lengths differs from its effect on the Pattern's original length.

Nudge only shifts "active" steps in the Pattern. Thus if a Pattern of 16 steps is shortened to, say, 12 steps, the data for Steps 13 to 16 – which continues to exist, but is rendered temporarily inactive by the reduced Length - is not shifted.

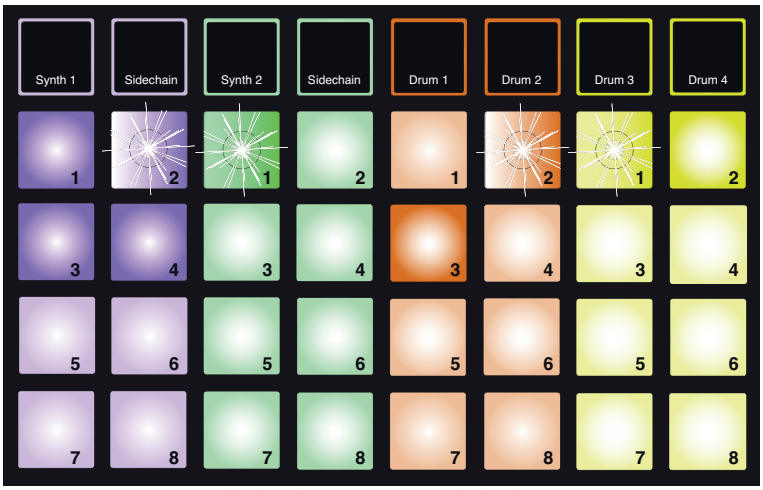
Remember that when using Nudge with Patterns of less than 16 steps, the effect of Nudge is restricted to the Pattern length. Steps outside the Pattern length will be unchanged.

Chaining Patterns

Once you've created several Patterns for one or more tracks, you can start to chain them together to make a longer sequence. You do this on a per-track basis: to chain four Patterns together on a track, press and hold the pad for the lowest-numbered Pattern required and then press the pad for the highest-numbered Pattern required. For example, if you want to chain the Patterns in memories 3 to 6 together on a particular track, hold Pad 3 down and then press Pad 6. You'll see that all four pads now illuminate brightly in the track colour, to confirm that they are all now part of the chained sequence.

What's important to remember is that the Patterns you chain together must be contiguous, that is, numerically consecutive. You can chain Patterns 1, 2, 3 and 4 together, or 5, 6 and 7 together, or 4 and 5 together, but you can't chain 1,2 and 6 together.

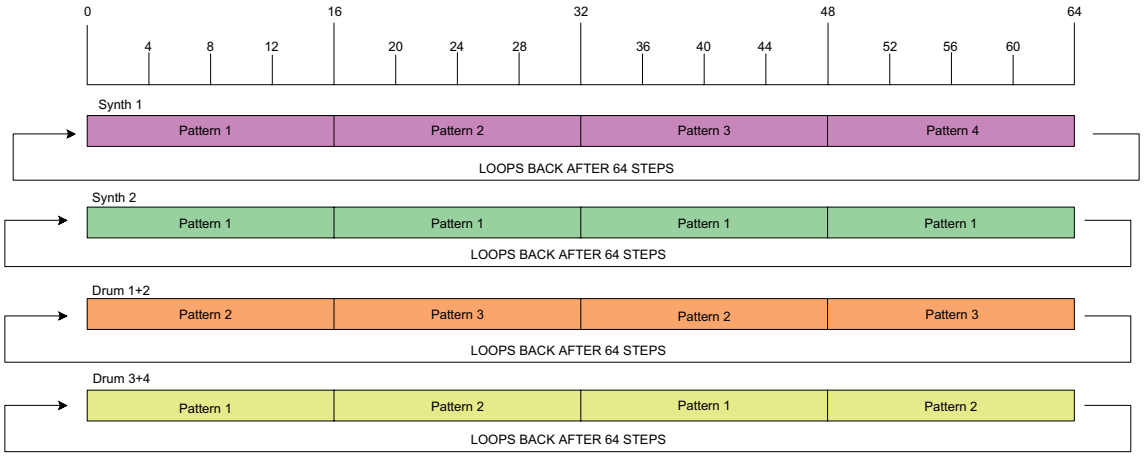
The following example will illustrate these points.



Pads with stars are pulsing dim/bright

The Pattern View example above shows a possible arrangement of Patterns for a 4-pattern (64-step) sequence. We are using four Synth 1 Patterns (Pads 1 to 4), one Synth 2 Pattern (Pad 1), two Drum 1+2 Patterns (Pads 2 and 3) and two Drum 3+4 Patterns (Pads 1 and 2).

When you press Play, each track will loop round its own chain of Patterns. The longest chain is Synth 1 – this defines the overall length of the sequence, in this case, 64 steps. Synth 1 will play Patterns 1 to 4 in order, and then loop back to Pattern 1 and start again. Synth 2 only has one Pattern, so this will repeat four times in the 4-pattern sequence. Both drum pairs have two Patterns in the sequence, a total of 32 steps each, so they will play twice. What you hear is illustrated in the timeline below:



The above example illustrates the basic points involved in chaining Patterns together to make a longer sequence. Creating longer, more complex and more interesting sequences is merely an extension of these principles. Circuit allows sequences of up to 128 steps, with each of the four tracks changing pattern every 16 steps.

Every time you press **Play**, the Pattern restarts from the beginning of the first Pattern in the chain. You can restart the Pattern from the point at which the sequencer was stopped by pressing **Shift** and **Play** together.

Pattern Octave

You can shift the pitch of an entire synth Pattern up or down one or more octaves by holding down **Shift** 19 and then pressing **Oct** ▼ or **Oct** ▲ 13. You can do this either while the Pattern is playing, or in Stop Mode. For Pattern Octave to work, you must be in a ***Synth View***, i.e., any of the ***STEP*** or ***PATTERN Views*** (but not when in ***Patterns View***). Only the pitch of the currently selected synth is adjusted, that of the other will remain unaffected.

If the synth pattern contains notes which are already in the highest octave that Circuit can generate, they will remain unaffected by an upward Pattern Octave shift; the same applies to the lowest notes and a downward octave shift. If this is the case, the **Oct** button will light red to indicate that the command cannot be executed.

TEMPO AND SWING

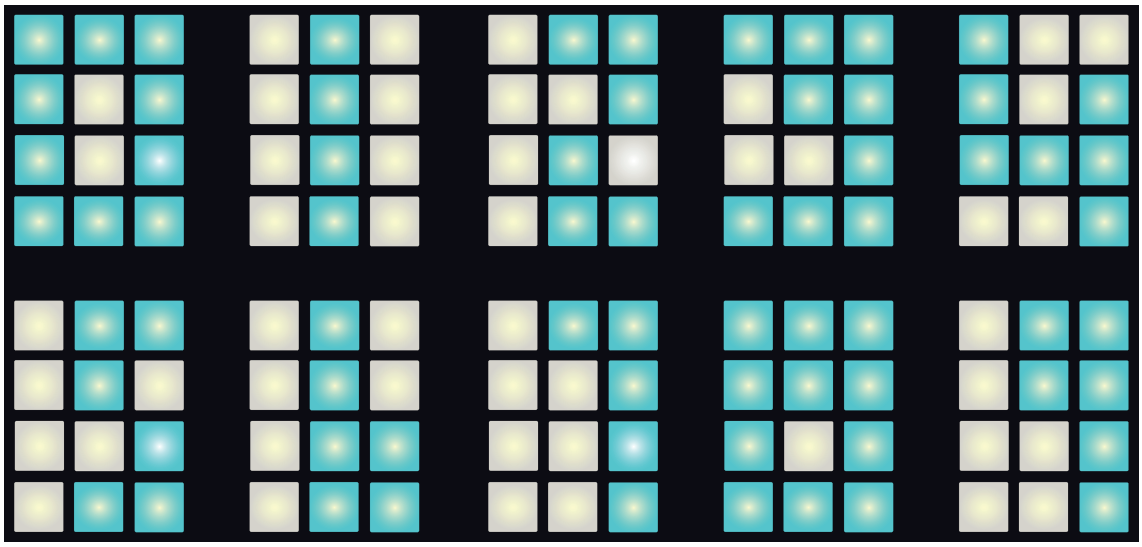
Tempo and Swing are closely related and the methods of adjusting them are very similar.

Tempo

Circuit will operate at any tempo in the range 40 to 240 BPM; the default tempo is 120 BPM. The tempo can be set by the internal tempo clock, or, if you are working with other MIDI devices or a DAW, by an external MIDI clock source. External MIDI clock can be applied either via USB or the MIDI IN break-out cable.

To display and adjust the BPM of the internal tempo clock, press the **Tempo** button 14 (like most of Circuit's buttons, you can press and hold to view momentarily, or make a short press to retain the tempo display).

The BPM is displayed on the pad grid as two or three large digits in blue and white. The "hundreds" digit (which can only ever be a "1", "2" or off) occupies grid columns 1 and 2, while the "tens" and "units" digits occupy three columns each, How the digits 0 to 9 are depicted is illustrated below.



Macro control 1 is used to adjust the tempo; its LED illuminates bright blue.

External clock

No switching is required to allow Circuit to be slaved to a source of external MIDI clock (subject to clock settings - see Appendix). If a valid clock signal is applied, it will automatically be selected as the clock source, and the grid will display the work "SYN" in red and white. Macro 1 is disabled and its LED goes out.

While the internal tempo clock only allows discrete numbers of BPM (i.e., no fractional tempo values), Circuit will synchronise to any external clock rates – including fractional values - in the range 30 to 300 BPM.

If an external clock is removed (or goes out of range), Circuit will stop playing. The "SYN" display will remain visible until **Play** button is pressed (i.e., cancelled). The display will then show the BPM value that was saved with the Session and Macro 1 will be re-enabled and can now be used to adjust the tempo.

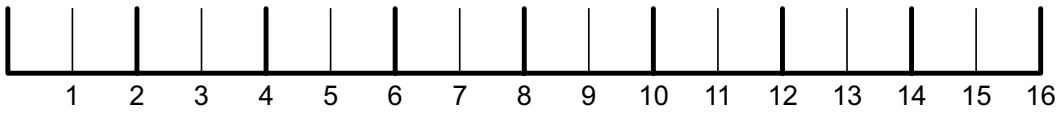
Tap Tempo

If you want to match Circuit's tempo to another piece of music and you don't know its BPM, you can use Tap Tempo. Hold down **Shift** 19 and tap the **Tempo** button 14 in time with the track you're listening to. You need at least three taps for Circuit to change its tempo setting to your manual input, and will then calculate the BPM by averaging the last five taps.

You can use Tap Tempo at any time, but if you're in ***Tempo View***, you'll see the BPM display update itself to the tap tempo.

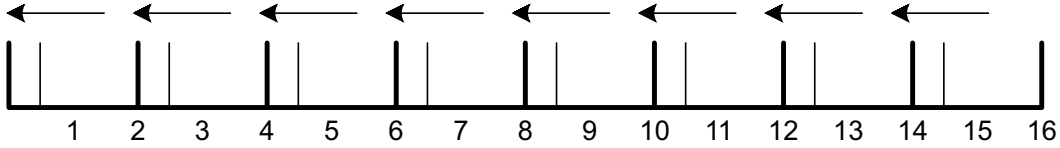
Swing

By default, all steps in a pattern are equally spaced in time. At tempo of 120 BPM, a 16-step pattern will repeat every 2 seconds, making the steps one-eighth of a second apart. Altering the Swing parameter from its default value of 50% (the range is 20% to 80%) alters the timing odd-numbered steps (the off-beats); a lower swing value shortens the time between an odd beat and the previous even beat, a higher Swing value has the opposite effect.



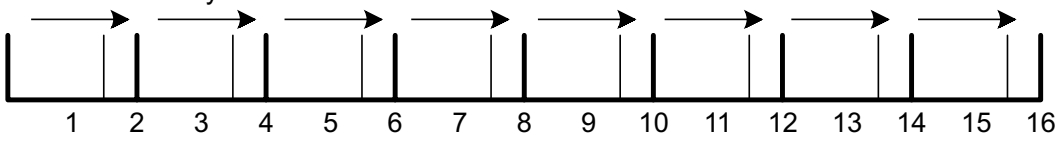
Swing = 50%

Odd beats are advanced



Swing = 25%

Odd beats are delayed



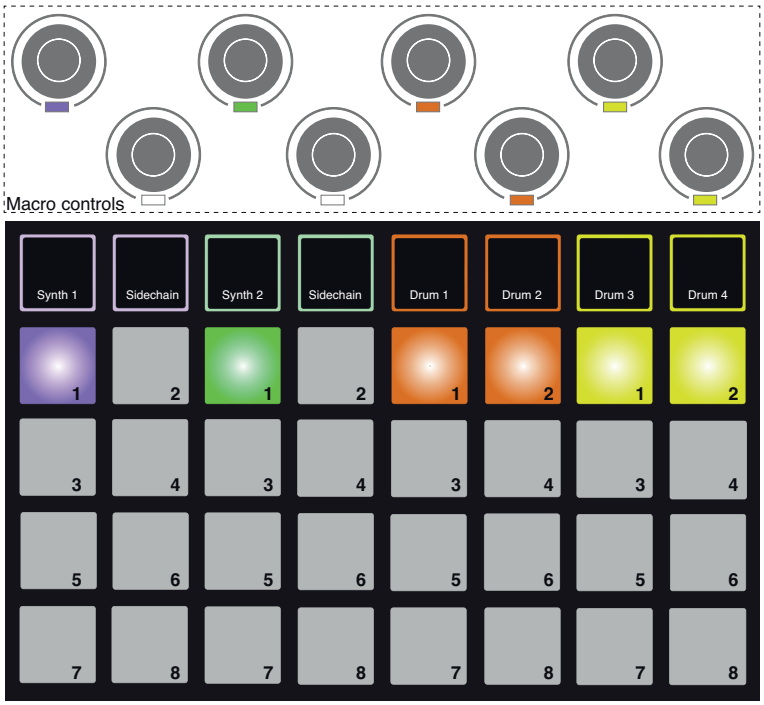
Swing = 75%

Swing can be used to add an extra "groove" to your pattern. Note that as it is the odd steps that are "swung", these can be interpreted as 1/16-notes (semiquavers).

MIXER

Circuit includes a six-channel mixer to let you adjust the volume of each track (i.e., instrument) relative to each other. By default, all the tracks are played at a volume level of 100 (range 0 - 127), leaving you with the **Master Volume** control [4] to adjust the speaker volume and output level as required.

Press **Mixer** [10] to open ***Mixer View***.



The six illuminated pads are effectively Mute buttons for each track. Press a pad to mute the track; the pad's illumination dims. Pressing a Mute button stops the sequencer triggering notes in the synth.

The level of each track is adjusted by the Macro control vertically in line with the grid column. The encoder LEDs are illuminated with the track's colour-coding, and dim as the track level is reduced.

Track	Pad (Mute)	Macro (Level)
Synth 1	1	1
Synth 2	3	3
Drum 1	5	5
Drum 2	6	6
Drum 3	7	7
Drum 4	8	8

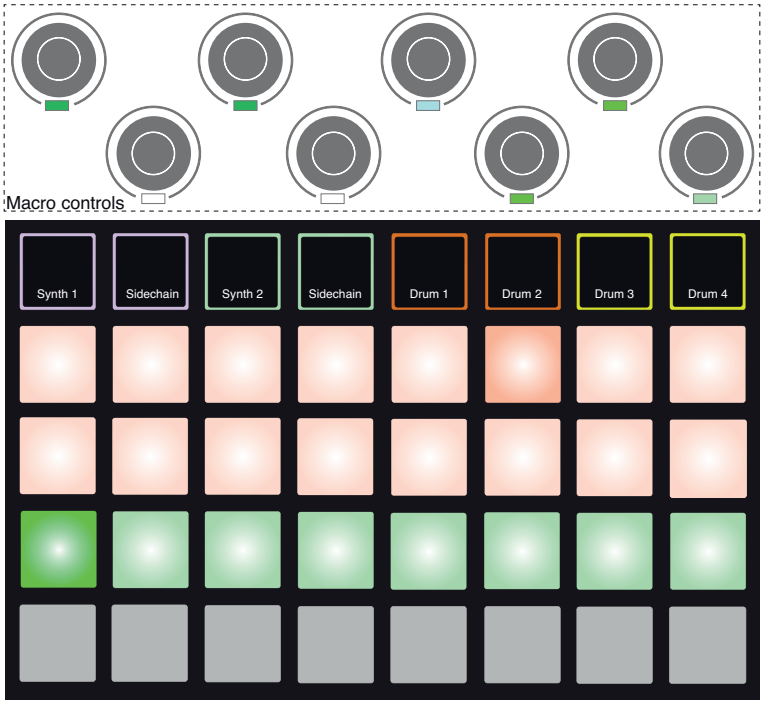
Macros 2 and 4 and all other grid pads are disabled in ***Mixer View***.

Track levels in Mixer View are automated. If Circuit is in Record Mode, adjustments of the individual track levels will be recorded to the Pattern.

FX SECTION

Circuit includes a digital effects processor (FX) which lets you add delay and/or reverb effects to any or all of the tracks making up your Session. Sixteen delay and eight reverb presets are provided, and you can select any one of each type. The send level from each instrument - how much reverb and/or delay there is on each track – is individually adjustable using the Macro controls.

Press **FX** 11 to open ***FX View***.



Each of the “peach” pads on Rows 1 and 2 calls up a delay preset, and similarly, the “pear” pads on Row 3 enable reverb presets. By far the best way to evaluate the various effects is to listen to them, most effectively on a single repeating hit like a snare drum. As a general rule though, the reverb presets are arranged with increasing reverberation time from Pad 17 to Pad 24, and the delay presets with increasing in basic delay time from Pad 1 to Pad 16. All the delay presets feature feedback for multiple echoes, and some include some interesting pitch shift and stereo pan effects as well.

To add reverb to one or more of your tracks, select a reverb preset. The pad corresponding to the active preset illuminates brightly. Macros 1, 3, 5, 6, 7 and 8 are now the reverb send level controls for the six tracks: this is exactly the same arrangement as used in ***Mixer View*** (see table at page 54). The LEDs under the six macros are now dimly lit pear; as you increase a send level you will hear reverb being added to the track it controls and the LED will increase in brightness.

You can add the selected reverb effect to any or all of your tracks to different degrees by using the other Macro controls. It is not possible to use different reverb presets on different tracks, however.

Adding a delay effect is exactly the same process: select an effect from the first and second rows of pads. The same six Macros are now delay send level controls; you'll see that their LEDs are now showing peach to confirm their reassignment to delay effects.

Although the same Macros are used as reverb send levels and delay send levels, the two effects remain independent: the Macros adopt one function or the other according to whether the last FX pad pressed was a reverb preset or a delay preset.

The FX send levels are automated in the same manner as the Macro control "tweak" functions; you can deliberately increase or reduce an effect during a sequence and if Circuit is in Record Mode, the changes will become part of the sequence. The **Clear** button 16 can be used to delete automation data for the FX send control: press **Clear** and turn the send control for which you no longer require automation; the LED turns red to confirm the action.

See also "Recording Knob Movements" on page 36.

SIDECHAINS

Each of Circuit's two synths has a Sidechain feature. This works in the same manner as common dynamics processors such as compressors, and can be used to alter the "envelope" of synth notes in time with the main beat – the "key" source for both sidechains is always Drum 1.

The Sidechain feature allows the hits of Drum 1 to duck the audio level of the synths. Using synth presets which produce sustained notes, or using shorter sounds with long Gate times, you can make the kick drum "pump" the synth sounds to produce some interesting and unusual effects.

Seven Sidechain presets are available in Circuit, each allowing Drum 1 to modify the sound of Synths 1 and 2 in subtly different ways. The default state is for Sidechain to be OFF on both synths.

To open ***Sidechain View***, press **Sidechain** 5 for either Synth 1 or Synths 2. For Synth 1, the ***Sidechain View*** looks like this:



Sidechain View for Synth 2 is identical.

The lower three pad rows are disabled. The top row of pads corresponds to the seven Sidechain Presets (Pads 2 to 7); Pad 1 is 'the OFF button' – this disables sidechain processing for the selected synth. Pad 1 is illuminated bright red when the Sidechain is OFF; press any other pad in the row to enable one of the Sidechain Presets, and Pad 1 becomes dim and the selected Pad shows bright white.

As with many of Circuit's other features, by far the best way of understanding sidechain processing is to experiment and listen. A good starting point is to set a single synth note to have a Gate value of 16 so that it sounds continuously, and make Drum 1 play a few kick drum beats. As you select different Sidechain Presets, you'll hear the different ways in which the continuous synth note is "interrupted" by the drum. The same Sidechain Preset may have a

markedly different effect when used with different synth patches, so it is worth experimenting with various synth sounds as well. Above all, because sidechain processing is modifying time parameters, the effect will be more or less interesting depending on the relative timings of the synth patterns and Drum 1.

The “key” source for the sidechains is derived pre-fade; this means that if you turn the level of Drum 1 right down in ***Mixer View***, any sidechain processing enabled will continue to function operate even though you can’t hear the drum any more. This is a feature which can be used quite creatively!

Note that the Macro controls still function as “tweak” controls for the selected Synth in ***Sidechain View***.

THE FILTER KNOB

The entire audio output of Circuit – the sum of the sounds from all six tracks – is fed through a traditional analogue-style filter section. The control for this is the large **Filter** knob 2. The Filter knob on most synthesisers is one of the key performance controls and can be used to radically change the overall sound: **Filter** on Circuit works in a similar way.

The Filter encompasses both low-pass and high-pass types. A high-pass filter removes low frequencies (bass) from the output and a low-pass filter removes high frequencies (treble). Circuit’s **Filter** knob controls a low-pass filter when you turn it anticlockwise from the centre position and a high-pass filter when you turn it clockwise from the centre position. Note that the control has a detent in the centre – in this position, no filtering takes place and the LED below the knob is dimly lit blue. As you turn the knob clockwise, you’ll hear the kick drums and lower notes disappear leaving you with a much thinner sound; in the opposite direction, the high notes disappear first, leaving you with a muffled sound. The LED changes to white when either filter type is active, with the brightness increasing as the control is turned.

SESSION SWITCHING

A basic overview of loading and saving Sessions can be found at page 18. This chapter looks at some additional aspects surrounding the use of Sessions.

There are some rules governing how Circuit responds when you change from one Session to another. If you're in Stop Mode (i.e., with the sequencer not running) and change Session in ***Sessions View***, when you press the **Play** button, the new Session will always begin from Step 1 of the Pattern; if the Session comprises chained Patterns, it will begin at Step 1 of the first Pattern. This will be the case regardless of which step the sequencer was at when the previous Session was stopped. The tempo of the new Session will replace that of the previous one.

There are two options of changing Sessions while in Play Mode:

1. If you simply select a new Session by pressing its pad, the current Pattern will play through to its last step (note – only the current Pattern, not a complete chain of Patterns), and the pad for the new Session will flash white to indicate that the next Session is being "queued". The new Session will then begin playing from Step 1 of its Pattern, or Step 1 of the first Pattern in a chain if the Session comprises a chain.

2. If you hold down **Shift** while selecting a new Session, the current Pattern will stop playing and switch instantly to the new Session. The new Session will play from the same step in the Pattern chain that the previous Session had reached. This obviously gets complicated (and often musically interesting!) when the two Sessions either contain Patterns of different lengths, or different numbers of Patterns making up a Pattern chain. As we have mentioned elsewhere in this User Guide, experimentation is often the best way of understanding how Circuit deals with this.

Clearing Sessions

Clear 16 may be used in ***Sessions View*** to delete unwanted Sessions. Press and hold **Clear**; it illuminates bright red and all the grid pads extinguish except that for the currently selected Session, which shows bright white. Press this pad to delete the Session; the pad flashes rapidly for a second or so.

Note that this procedure makes it only possible to delete the currently selected Session; this provides a safeguard against deleting the wrong Session. Always check that a Session pad contains the Session you want to delete by playing it before you hit **Clear**.

It is not possible to delete a Session if Save is disabled (the state that Circuit is shipped in from the factory). See page 18 for details of how to enable Save.

APPENDIX

Firmware Updates

Updating Circuit's firmware is very simple. Novation is constantly refining the operating systems for all its current products, so do make a point of checking the download website from time to time for any Circuit updates.

Firmware updates can be found at www.novationmusic.com/downloads. Select **`Circuit`** from the **`Find support for:`** dropdown list. If an update is available, connect Circuit to your computer with the USB cable supplied, connect the AC power adaptor and turn Circuit on. (Updating firmware while powering Circuit from batteries is not recommended.)

Click on the downloadable file, and as the new firmware downloads directly into your Circuit, you will see pairs of green pads moving from left to right while a pattern of red pads rotates around them. Circuit will automatically enter its normal operating state when the download is complete.

Bootloader Mode

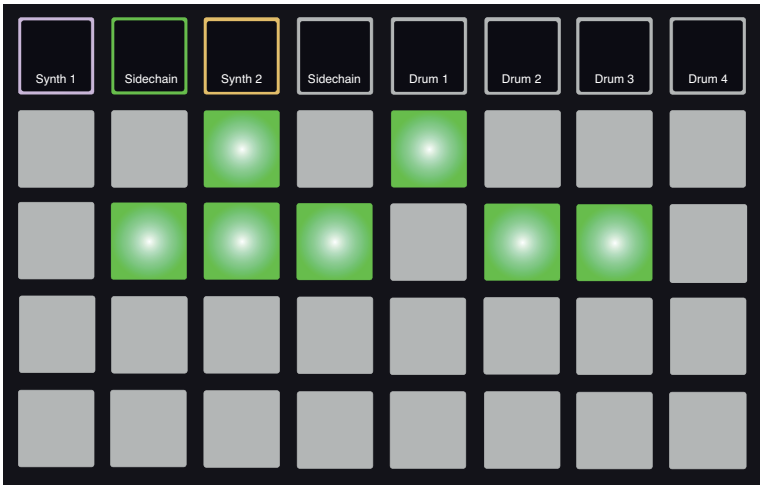
In the unlikely event of a problem with your Circuit, it may become necessary to enable Bootloader Mode. This is strictly an "engineering mode", and all normal unit functions become inoperative. You should not use Bootloader Mode without instructions to do so from Novation's Technical Support team.

Bootloader Mode lets you check the version numbers of the currently installed firmware, and also to update firmware (and factory Patches) should the Firmware Update procedure described above not work correctly for any reason.

To enter Bootloader Mode:

1. Turn Circuit off
2. Hold down the **Scales** 8, **Note** 6 and **Velocity** 6 buttons
3. Power Circuit on again

Circuit will now be in Bootloader Mode, and the grid display will look something like this:



Synth 1, (Synth 1) **Sidechain** and **Synth 2** are lit; selecting each of these generates a pattern of illuminated pads; the pattern represents the version numbers of the three firmware elements in binary form. You may need to describe these patterns to Novation's Technical Support Team in the event of a problem.

Bootloader Mode is most easily exited by simply pressing the **Play** button. Circuit will then reboot into the normal operating state.

MIDI I/O

Circuit is able to send and receive MIDI data both via the USB port (3) and the dedicated MIDI IN and MIDI OUT sockets (2). Use the 3.5 mm TRS jack-to-5-pin DIN breakout cables supplied to use standard MIDI cables to connect the latter to other MIDI equipment.

When it is shipped from the factory, both MIDI Rx and MIDI Tx are ON.

To enable/disable MIDI transmission (Tx) and/or reception (Rx), Circuit must be placed in a special ***Setup View***. This is accessed by holding down **Shift** [19] while powering Circuit on. (Remember to save any unsaved work before powering Circuit off!)

The display will look like this:



The first two pads in the bottom row control MIDI Rx and MIDI Tx respectively. A red illumination means that Tx or Rx is OFF; a green illumination that Tx or Rx is ON.

Note that the MIDI Tx/Rx settings have no effect on how Circuit uses MIDI clock. Clock settings are described on the following page.

Clock settings

The method of selecting internal or external tempo clock is very similar to the above MIDI I/O on/off selection.

The two right-hand pads in the bottom row select AUTO mode (left) or the internal clock (right).

The two pads act as a “toggle pair”: that is, selecting one deselects the other. One pad will be lit bright blue (selected), the other dim blue (not selected). When shipped from the factory, Clock mode is set to AUTO, so the left-hand pad will be brightly lit.

When INT is selected, Circuit’s BPM is defined only by its internal tempo clock. Any external clock will be ignored. When AUTO is selected, the BPM will be set by an externally applied MIDI clock at either the MIDI IN or the USB ports if a valid one is applied; if this is not the case, Circuit will automatically switch to its internal clock.

See also page 52.

IMPORTANT
For any changes made to ***Setup View*** to be retained, Circuit must be powered off by the rear panel power switch in the normal way. Disconnecting the external PSU may cause errors.

Session loading problems

Circuit loads the last selected Session when it is powered-up. It is possible that if the power was interrupted while a session was being saved it may have become corrupted in some way. This might mean that Circuit ends up in some anomalous state at power on.

Although this is a very unlikely occurrence, we have included a method of turning Circuit on and forcing it to load a blank Session instead. To do this, hold down both **Shift** and **Clear** while turning Circuit on.

If any Sessions do become corrupted in any way it is always possible to delete them by using Clear Session (see “Clearing Sessions” on page 59)

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