About the new LG2 setup structure

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An important target when redesigning the LG2 firmware was to simplify the current setup structure. Although the current setup allows for a maximum of flexibility and reuse of different parts within the setup, several users gave us the feedback that the structure is rather overwhelming at first sight, and not very straightforward. Especially the introduction of the concept of "patches" versus "presets" was new and needed getting used to. It also required some extra configuration steps, even for the most simple setup. Therefore we decided to do a major change in the whole concept, and remove this distinction between patch and preset again.

The new editor will allow you to create presets, and add MIDI messages or GORDIUS specific commands to the 2 message streams of those presets directly. No more intermediate level of patches containing message streams, and presets combining a main patch with extra preset properties. Also, the new preset doesn't have any other property to set, except for its 2 message streams.

Then, where did all that functionality go, covered by the old patch and preset setup ?
The short answer: in the message stream content. The number of "GORDIUS specific commands" supported in a message stream, has been extended, in order to support all of the old patch and preset functionality, and much more. See also the last chapter of this document.

4 preset *types* have been retained, you will easily recognize them :

- Patch (one patch at the time can be active, the active one has its LED turned ON)
- Trigger (a patch which doesn't stay selected. It just triggers a command, e.g. Looper "Play")
- two-state effect (AKA stompbox, can be ON or OFF, multiple can be active at the same time)
- momentary effect (only active as long as the switch is depressed, example: a sustain pedal)

1.2   Macros

A new element type was added to the setup structure: the "macro". The concept of a macro is very simple: it's a grouping of messages (MIDI messages or GORDIUS commands), which can be reused. The introduction of a macro allows you to keep the same level of "reuse" which was originally offered by the layered patch/preset structure. The obvious advantage of the "macro" approach, is that its use is optional. When creating a simple setup, you no longer have the overkill of duplicating patches and presets, and a setup can be very straightforward to create. If you want to reuse certain parts of your message setup, you can use macro's. On the other hand, due to the highly extended memory size of the new hardware, optimizing your setup through reuse of certain info is no longer as important as it used to be.

1.3   Banks vs Songs

Another improvement, introduced in order to simplify a setup, is the possibility to keep songs and banks "synchronized" at all time. Experience of the past few years has learned that many users choose to have one bank created for each song. A logical approach. However, this again forced the user into doing some redundant work: create a bank, give it a meaningful name, then create a song with the same name, and link both together. The new editor allows to automate this, so that you no longer need to input the same data on 2 places. Especially with the extended setup size, which allows up to 1000 banks to be created, there is less need to reuse the same banks for multiple songs just for the sake of setup size optimization.

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2   Extending the setup structure

2.1   Setup size and dynamic allocation

The memory footprint of the "generation 2" LittleGiant has been widely extended, allowing for much larger setups than today. On top of that, the idea of "dynamic memory allocation" has been taken one step further. In the current setup, it was already the case that no fixed memory size was allocated for each preset. A preset just allocates exactly the amount of memory it needs, not more. In Control Center, you could check which percentage of the available patch memory had been allocated so far. Same for the preset memory, bank memory and song memory. The new setup structure merges those different setup types, and stores all elements in one contiguous block of memory. If you decide not to use songs in your setup, you can allocate all memory to presets and banks. This system is a challenge to implement, but it offers the ultimate flexibility and optimal use of the available memory. Along with the increased memory size, this opens nice perspectives for adding memory consuming features later on : displaying song lyrics for instance, or using the LG2 as MIDI sequencer...

2.2   Number of setup "elements"

Why has there been such a huge delay between release of new extended hardware and the new firmware which takes advantage of the increased memory size? The main reason is that the current firmware was heavily depending on an overall restriction of maximum 256 setup elements. From the digital world, you will recognize 256 as the number of items which can be represented by an 8-bit value. This is why the current setup has following restrictions :

- 128 patches + 32 stompboxes + 32 momentary effects :+ 16 expression pedals
  giving a total of 208 elements to be referenced in a preset setup.
- 186 patch presets + 32 stompbox presets + 32 momentary effect presets
  resulting in a total number of 250 presets to be referenced in a bank setup.
- same thing for the bank setup which can contain 250 user banks plus 3 special banks
- same thing for the song setup which can contain 240 songs plus 10 setlists.

In order to support the largely extended memory space, it was necessary to re-organize the complete setup, and start using 16-bit references instead of 8-bit. As a result, almost the complete LG2 firmware needed a rewrite. For this same reason, we can now easily support up to 1000 elements of each type, the only practical limit being the amount of memory available. Due to the dynamic memory allocation, it's not easy to give a strict upper limit for the total number of elements supported. As a matter of test, we just created a sample setup which almost completely fills the available memory. This setup contained following number of elements, all given a realistic name (name length obviously influences the amount of memory needed) :

- 1000 patches, each containing 16 different ProgChange messages
- 1000 stompboxes, each containing 32 different ControlChange messages (16 "on" / 16 "off")
- 10 triggers, 10 momentary effects, 10 macro's, containing similar amount of messages.
- 1000 banks, with 10 switch assignments each (i.e. a fully populated LG2 setup)
- 1000 songs, organized in 10 setlists of 100 songs each.

This number of elements gives you a realistic idea of the limits of the current design. We believe it's safe to say that the limits of the system will never be reached in a real-world setup.

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3   New functionality, not available in the current LG2

We will not give an extensive overview here of the new features which the version 3.0 firmware brings. In short, while the high-level setup structure (presets / banks / songs) is simplified as much as possible, the strength of the new firmware lies in the wide support for GORDIUS specific commands as part of a preset message stream. You can read about each of the commands in the online documentation of the new ControlCenter: press F1 (or select the menu item Help) while in the Content page of ControlCenter. The help screen about preset content pops up. It contains following list of commands, with a short help page on each of the command types. Have a look there!

List of supported messages in the new v.3.0 firmware :

> MIDI message
> Tempo message
> Delay message
> Sweep message
> Loop message
> Variable message
> SetDirectBank message
> ActivateEffect message
> ActivateContCtrl message
> Navigate message
> DirectSelect message
> KeypadMode message
> StompboxMode message
> DisplayMode message
> DisplayTuner message
> DisplayLyrics message
> ControlLED message
> ControlRelay message
> SetRouting message
> Suspend message

4   How to convert my old setup to a new one

First of all make sure you have the latest version of the current Windows ControlCenter installed : version 2.3.2. Load your setup, and go to File > Export setup to... > v.3.0 setup.
Now you can open the resulting file in the new (Windows or Mac) LG2ControlCenter. You will find most of the setup intact. Following elements are converted :

- all global settings which are still supported
- MIDI channel names and data variables
- Expression pedal setups and sweep curves
- All presets (patches, stompboxes, mom.effects) and their message content
  [Stompbox activations as part of the preset setup are translated into specific stompbox activation messages in the preset message content]
- All banks, songs, and setlists

(if it looks like you are still missing a large part of your setup after conversion, don't hesitate to send us your setup, and we will look into finetuning the conversion tool for a better result)

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Following parts of the setup will need reprogramming in the new editor :

- **patch setup : Grouped stompboxes.**

Stompbox activation is now programmed by adding the necessary activation message to the preset message stream. You can add the necessary stompbox de-activation messages to obtain "grouped" behavior. If this needs to be done in many presets, you can consider creating a macro for this.

- **Patch setup : "variants"**

Variants were a solution to work around the limited number of available patches. You can easily create extra patches now without hitting the upper limit of 1000. Also the datavariable system will be easier to use without the distinction between patches and presets. Let us know if you have suggestions to further support specific user scenario's which were previously implemented using "variants"

- **Preset setup : stompboxes and expression pedals**

These translate into the commands ActivateEffect and ActivateContCtrl, added to the preset message stream, and are added automatically during conversion.

- **Preset setup : momentary effects :**

No longer supported as part of a preset activation. Consider defining macro's instead.

- **Preset setup : Extra patches**

Simultaneous extra patches can also be replaced by macro's, if they were created for frequent reuse in different presets. Sequential extra patches are now covered in the bank setup. You can choose to link a single preset to a switch, but you can also link a list of presets to a single switch. In that case, the presets will be activated sequentially, just like the "sequential extra patches" today. (the merge of the "patch" and "preset" concepts removes some of the restrictions of the old "sequential patch" system)

- **Bank setup : Default switch**

This is replaced by the more flexible "default preset", similar to the song setup.

- **Bank setup : Goto next / previous / previously active preset**

These and more "navigation" commands are added to the available preset command list. So you can just create a specific preset which contains the required "Goto.." command, and link it to any switch.

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- **Bank setup : dependency rules**

The dependency rule system is an advanced feature in the current LG2 setup, which allows you to modify the current bank layout, depending on the currently active preset. Although very powerful, the setup could be somewhat tricky, and hard to maintain. We believe that the new setup structure offers sufficient alternatives to the dependency rule system, therefore we decided to drop it. Below are a few examples of how to replace the dependency rules with an alternative.

1. One specific scenario which typically lead to the creation of a large set of dependency rules, is the following : depending on the selected preset, some effects may be available, others may be not available. It was already easy to set the initial state of "available" stompboxes through the stompbox list of each preset. However an "unavailable" stompbox needed to be removed from the switch layout through a dependency rule. (for instance the Axe-LG merge tool created a large set of such dependency rules to accomplish this) The new ActivateEffect command now introduces a new state for a stompbox : in a preset you can specify if an effect is ON, OFF, or "unavailable". This third new status gives you an easy solution which no longer requires the use of dependency rules.

2. Another scenario for using dependency rules is modifying the function of a switch after clicking it. There were 2 ways to do this : "extra patches" within a preset would let you scroll through patches using a single switch. On the other hand, if you wanted to scroll through a list of presets instead, you needed to create a set of dependency rules to do so. Thanks to the merge of the 2 concepts "preset" and "patch", the new setup structure makes it very easy to scroll through several presets with a single switch: the new bank setup allows you to link a list of presets to one switch. No more need for dependency rules for this scenario..

3. A very powerful set of new commands are "Navigate" commands. Using these commands, any preset can activate a new bank, song, banklist or setlist, along with some more preset activation possibilities. The "activate bank X" command added to a preset message stream can replace the most general use of a dependency rule. Thanks to the support for up to 1000 banks, you can easily create preset-specific bank "variations", which are activated after selecting the presets.