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My Pokit scope(s)

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New 02Aug2023. Updated 05Aug2024 (Search for «[SG 05Aug2024](#)» (but expand all folds first)). This note is about some individual scope channel devices which send their curves to a mobile app. This app runs on several platforms. «My Pokit scopes» as in plural, is this correct? Or should it be called «My Pokit scope»? So I changed it to «My Pokit scope(s)». [Observe Standard disclaimer](#).

Intro

- This note is **not a review** of the Pokit Meter «medallion» or the Pokit Pro handheld «thick probe» or the Pokit (iOS) app. **Therefore all the things I do like about these products (like its technical solution, the design and the visual appearance of the app, just watch the tutorials at [7]), would only be little commented here. Rather, it's a problem-centered note as seen from me as a user.** → I do admit that I may not be the kind of user these instruments were designed for. I'd like to see continuous updates of different sound spectra every 32 ms (kind of like at movie speed; seeing the spectra change rapidly does make sense to me), not really to inspect waveforms that don't change much over time
- Disclaimer: I am not a specialist in the Pokit universe. You should always try to double check

my claims to verify them. If you find any of them wrong or confusing, adding value would be to comment here. Alternatively, mail me ([here](#))

- It is much structured as a log. If it looks confusing it's because I *am* confused
- State now is that as a user I am [somewhat bewildered](#). See [Some doubt](#)
- My other oscilloscope blog notes (search for «scope» here): [Technology](#)
- For me this all started one time. Many, *many* years ago: [Radiobyggboken](#) (Google [translate](#)) – and then *some* years ago: [A scope to fulfill](#)

Fold handling with Collapse-O-Matic plugin

Expand All (for browser searching)

Collapse All

^ Typical fold

This text 123456789 will only be found with browser search when the fold is expanded. However, the search field on the top of this page is global for all notes, (expanding) all containing folds during the search. More precise: pages in that case will not have any collapsed state.

Pokit Innovations

Comments from the designer

Stephen Geary (electronics design engineer and the principal designer of the Pokit instruments, at [ingenuity](#), also [6]) has read the blog note as it was on 04Aug2024 and even mailed me some of his comments. Thanks! I have added those he mailed me here. Search for «[SG 05Aug2024](#)» (but expand all folds first). I am very grateful for his enhancement of this note.

Pokit Innovations is a small Sydney (Australia) based startup with some interesting products. Start at [www.pokitinnovations.com](#). Their parent company is [Ingenuity Design Group](#). It's pronounced like «pocket» → «pockit», not «poke-it» (which was my first try, as some Americans would say, a guy at Pokit told me in a mail. But then, I did spend a year in the US.. ('67-'68 at [Fisher High School](#) (again many, *many* years ago)).

Pokit made a custom order for me, since their shopping software did not differentiate between *discount* (valid for one one per order) and *bundles* (several per order). Since I wanted *two* bundles (both were discounted) adding one bundle removed the discount of the other.

Then they asked me, and I was happy to reply: «*What do you plan to use your Pokit devices for?*»

- Right now, experimenting with my **Beep-BRRR** project (listening device for hearing deficit people): [My Beep-BRRR notes \(some log & movies\)](#). I need to do this off home, so I have been looking for a portable scope for a long time. Plus, will also **log** from it so see how close to limits I am, and when. My plan is to use **Pokit Meter** for long-time logging and **Pokit Pro** for observing the spectra. One of the two Pros will be used as a trigger for the spectra picked up by the other
- Blogging about my experience with it (for fun, no income or gifts from it): (here). Again: [Standard disclaimer](#)

«What is your occupation and what industry do you work in?»

- I retired as a senior development engineer, having developed safety-critical HW and SW for 40+ years..

There is an interview with the design engineer behind the Pokit instruments at [\[6\]](#). Being inspired by my father and grandfather myself, I understand what he's saying there.

Some collected facts and comments

Collected from mails with a *senior* guy at the company. I have been allowed to publish this.

- The **SoC (System on a chip)** in the units is the **Silicon Labs EFR32BG12** [\[2\]](#). It contains a **BLE** (Bluetooth Low Energy) radio. It seems to contain *everything* except a (proper?) task concept and a scheduler in the firmware (*)
- «*If you have a second Pokit Pro you can use it as an external trigger for the first one and they will synchronize their waveforms down to about 1-2 microseconds. You can do this for up to 4 channels (one trigger channel, 3 slaves). This allows you to compare signals that correlate in time or measure a signal against a clock pulse (which sounds like what you want).*»
- The units may be updated over the air from the app. They use **Silicon Labs OTA** (over-the-air) protocol [\[1\]](#). They say «*which we do often to fix bugs, improve features, etc.*»
- The **user manual** and **low resolution pictures of how the Pokit Pro looks inside** (and outside for that matter) are published in the FCC bundle at [\[5\]](#)
- Any mails from «marsello» are valid. They seem to update earned points

(*) Pokit would (of course?) not disclose whether the units run any kind of operating system or if they use interrupts as their basic task model. But (thinking aloud), between those concepts is the Silicon Labs' system described as «**12-channel Peripheral Reflex System**» **PRS** [\[3\]](#) which is part of the **EMLIB** low-level peripheral library (not for radio functions) [\[4\]](#). Thus «*EMLIB modules are provided for all peripherals and core features. The library implements **no interrupt handlers**. Static data, critical sections and module interdependencies are kept at a minimum.*» I must admit that this looks rather nice, and as I write (and look up these things) I do learn. I get a feeling that a built-in low-level task con-

cept comes out of this SW library. I then think of «low-level» as something where «safe» tasks (which start at task-level encapsulation) don't come out of the box. Still, so much better than just interrupt handlers, where I guess that removing some of them only is for the good. I was used to chan with **occam** on **transputers** and am daily using chan with **xC** on **XMOS xCore** machines, where both architectures handle most of this in silicon or microcode (lots of blogs about this here). Tasks then just are present. Silicon Labs seems to have used the same **channel** word (which also rings a bell for **go** (golang) programmers, where chan is a SW matter only). This is interesting. I need to read more about it. All this being said, *I have no idea whether this library is used in the Pokit instruments, even if I do guess this is hard to avoid..*

```
(aside)n begin {
```

```
    The PRS is mentioned, along with Nordic Semi's (patented!) PPI in the Wikipedia article  
    Autonomous peripheral operation (below). But PPI and DPPI are, as far as I learn,  
    functionality implemented in hardware, with real-time guarantees
```

```
} end
```

Log

My devices



Fig.1 – Goodies box

07Sep2023 (updated 15Jun2024)

Pokit app for iOS (Version 1.7.0 as seen on the Devices screen, bottom right).

1. CH 1: Pokit Meter. (Black). **FW: 1.6.0.** (HW V1.70) (Since the cable winding got stuck I returned it in cooperation with Pokit support; a replacement is on its way)
2. CH 2: Pokit Pro serial number 26007 (Slate Grey with **Red**). **FW: V1.8.0 → V2.0.2** after update. (HW: V1.0)
3. CH 3: Pokit Meter. (Transparent white). **FW: 1.6.0.** (HW V1.70)
4. CH 4: Pokit Pro serial number 100008360 (Classic Grey with **Orange**). **FW: V1.8.0 → V2.0.2** after update. (HW: V1.0)

Small plus small is large

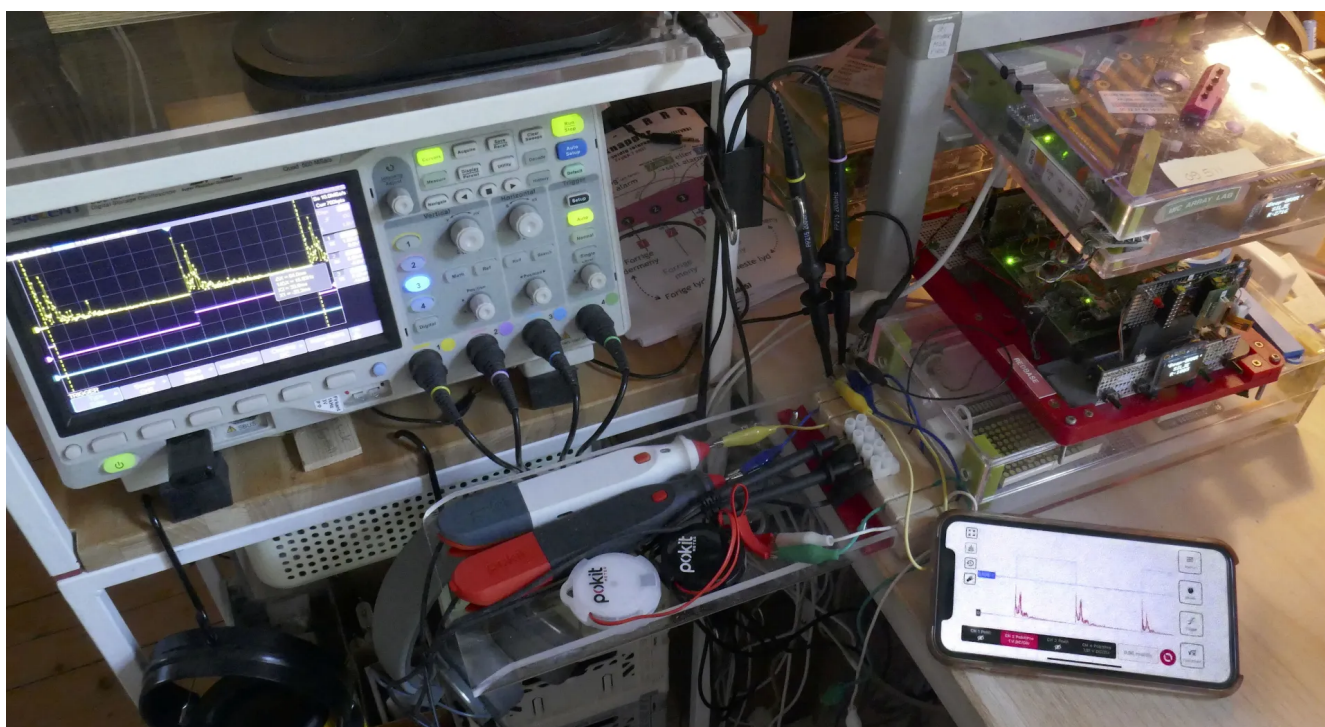


Fig.2 – My new «Pokit tray» and lab setup (Jun2024). The «scope» continuously, Pokit intermittently

Connecting my two Pros (and in the future, the two Meters), each of them quite small units, with the clips that come in the box, **add up to a lot of space on my desk**. But then, every time I am at IKEA I pick up a couple of transparent picture ledges [Mellösa\[196\]](#) that came in handy now. I use them as material to cut at my pleasing. One was quite nice for a tray for my Pokit units. In addition, I soldered up alligator clipped cables ([here](#)), on which the connections are done by clamping only, not good enough for years of measuring. I opened them and soldered the connections. Then I made a thick veneer screw terminal for the tips of the ground cables. Press on Fig.2 to study. It is easy to charge the Pros while they are resting in the tray, without unmounting them.

Some doubt

Referring to the above paragraph, these units *are* easy to put in the bag and run off with, but they still take space on the desk. And they are probably meant to «hold and measure», not really «connect and let measure» like a traditional scope. To repeat from the intro: [I'd like to see continuous updates of different sound spectra every 32 ms, not really to inspect waveforms that don't change much over time](#). However, in Log 02.01 I have so far got no indication on why «continuous measuring» does not seem to mean «continuous displaying» I get new curves the fastest every about one per second, like it's shown in [7] «Pokit User Guide – Oscilloscope – Pokit Pro». So they are not meant to show the 32 ms long spectra of some continuously changing sound, live – like my desktop Siglent scope does. And for that matter, the scope I built in 1964 ([here](#)), otherwise without comparison. **If I had understood this earlier I might not have bought the Pokit scopes.** Now I need to find something to use them for. To my rescue: the Meters may be nice to have for some remote logging, to see how often my Beep-BRRR detects a sound to alarm. I haven't built in a battery backed up clock (like I did in the aquarium control box), so logging would be part of the reason why I purchased those. And I could use the Pros to pick up the odd spectrum. But altogether they cost a lot. So **I might try to sell them. But in case, not without some grief. Mail me if you want to buy** ([here](#)).

^ Log 01

Newest at the bottom:

Log 01.01

Devices show up and are paired quite nicely. LOCATE starts a beep and a blinking on the Pros.

Log 01.02

Nothing happens if I try to LOCATE the two Meters, only the busy icon shows up for a short time. Nothing about this in the sparse manual ([p_help](#)) that came with it. So it's rather hard to find out which is which. Observe that there is **no button for Meter on, off or wake-up**. Read about this at [p_help](#). (However the Pro needs a press on its button to connect. The app would say «Connecting. Press Bottom To Wake» for the Pro, but only «Connecting» for the Meter. (I was taught in school that prepositions(?) should not have capital first letter in headings. I mean «To Wake» vs. «to Wake»))

SG 05Aug2024: «*On the Pokit Meters, the LED should flash blue however the Black one doesn't have a LED (because the case is opaque) so the button only really updates the battery info.*»

Log 01.03

One of the Pros had its connection strength graphics grayed out but the LOCATE still worked.

When is the connection checked and the indicator updated?

SG 05Aug2024: «There is a bug in iOS where the RSSI isn't showed correctly sometimes, refreshing the screen by navigating to another screen and back to the devices screen helps with this.»

Log 01.04

Setting the TYPE on the Pro has these colour *alternatives*: gray, red, yellow and orange. But they seem to exist as colour *combinations* when you order: Classic Grey with Orange, Slate Grey with Red, Classic Grey with Slate and Slate Grey with Yellow. Legend seems to be «body colour with end colour». The proof is that orange only exists as the end. I recognise the three, but not the gray. It's probably slate. I think that the app should have the same colour *combinations* as the ordering system has. Is a plant green or red if its flower is red? It's red. But it's not as obvious with advanced scope probes.

By the way, «light gray» is called «classic gray» and «dark gray» is called «slate gray». There certainly are some shades of gray ([Wikipedia](#)) for me.

Log 01.05

~~Setting the color on the Meters is inactive in the app.~~ No: I have to press the pencil, not the field. Strange. This goes for more settings. Smells of one source code, several platforms..

SG 05Aug2024: «It actually isn't one source code several platforms (yet, this is something we want to do to help with dev speed), but this is good feedback I have made a note of it to fix in a future update.»

Log 01.06

I updated both Pros to FW: V1.8.0. (HW: V1.0).

1. The app said: «Updating, do NOT remove pokit device battery or leave this application». The Pro does not have a removable battery
2. What does it mean to not «leave» the application?
3. What happens if the iPhone's screen had its light decreased during this? Mine did, it was ok
4. I hope it won't enter idle, that the app ensures that this does not happen?
5. And again, if this happens, will the update boot loader have kept a copy of the original firmware and install it later on, or is the boot loader able to update on top of a «half update»?

SG 05Aug2024: «We have the same message display for Pokit Meter and Pokit Pro (hence why the don't remove battery warning), the app tells the phone OS to not go into idle during the update, the bootloader does keep a copy of the original FW in case it fails, but on very rare occasions the bootloader has failed to load the backup image, in that case the bootloader then falls back to an OTA mode

where we can send you an OTA file to recover your device (we plan to implement a recovery screen into the app at some point but this is VERY rare so it's a low priority).»

Log 01.07

The Meters and the Pros each take up a channel. For me I'm full with CH 1 – CH 4. It looks like these are created equal. Since only the Pro may be used as a trigger input from another Pro, the Meter and the Pro have different behaviour. I have yet to discover how this is reflected in the app.

Log 01.08

I see that on a Meter LOCATE is shown as grayed out. It then also says «Connecting». After some time LOCATE is ok and its «Connected». Does this happen at random? I can also see LOCATE grayed out but still «Connected» and 3 signal strength bars. (All for my black meter)

Log 01.09

Signal strength indicators vary quite some between the devices, even if they all four lay on the table around the iPhone. Right now I have 3, 3,1,3. This is probably normal.

SG 05Aug2024: See Log 01.03

^ Log 02

These are from Jun2024. Newest at the bottom

Log 02.01

p_help: [Continuous sampling](#). Here is my initial posting. No answer yet.

The data sheet that the Pro has continuous sampling.

How is this enabled? I have two Pros and with (1) framing pulse switching high and low every 32 ms, and (2) a spectrum going 0-4 kHz inside that window.

I get about 20 double readings in a minute, not continuous readings. Trigger is continuous, rising. The screen does not position the curves at the same place every time either.

** Answer: [7] «Pokit User Guide – Oscilloscope – Pokit Pro»*

How do I set triggering level and how do I know which of these two inputs that is triggering?

** Answer: Same as above*

Now both seem to trigger at the same point (blinking and updating) about every third sec.

iOS 1.7.0 and the two Pros updated to V.2.0.2

Update: If I use Trigger «Free run» (as opposed to Trigger «Continuous») it runs faster, but the fas-

test I have been able to run it is some longer than one second per update. I would have liked to see my 32 ms spectrum immediately, like on my other scope. Now if I whistle a tone, that tone spectral peak appears on the app only after about a second. And then, the display floats on the time axis. See [Some doubt](#).

SG 05Aug2024: «The limitation here is twofold:

1. *Firstly the sampling is done before transmitting, i.e. if you have a sampling window of 1 second the samples will require 1 second + BLE transmission time to send to your phone.*
2. *The other issue is the aforementioned BLE transmission time, at time of writing the best we've been able to achieve successfully is around 250ms to transmit the 1000 sample packets in a datastream per Pokit Pro.*
We did make a build that sends the data to the app faster but we found that something in the phones OS would cause the data packets to arrive in the wrong order and cause the signal to look incorrect.
This is something we plan to revisit in the future.»

Log 02.02 to 02.17

2. 19Jun2024: The iOS app is still version 1.7.0, the same as in Sep2023. Since I do have quite a few comments here about the app, which I would think other users or those at Pokit have seen as well, I find this at best *strange*. I found an indication that the app has been unchanged since Mar2021[here](#). (Aside: Also, the «Range tester module» ([here](#)) is not available on this iOS app. But then, it seems to have to be subscribed to) (Aside: the [Pokit app for Android](#) has been updated on 24May2024, see [here](#). This *may* be relevant, but it doesn't have to be)
3. I updated both Pros to FW: V2.0.2. (HW: V1.0)
4. Since I had received a replacement Pokit Meter for the one with a stuck cable I had to unpair the old Meter in the app and search for it. I got this message at a time when both Pros and the old Meter were seen: «Pokit App. There was an issue connecting to your Pokit device. Try moving closer, or if you keep seeing this message, try replacing the battery or restart the app». The battery was new (I also measured it, the CR 2032 was on just above 3V), and I certainly couldn't come closer. But restarting the app solved it. The Meter was seen. (Comment: this is not good enough. Restarting the app!«?)
5. The «new» Meter came up with the LOCATE button not grayed out. Pressing it showed the busy indicator for a split second, but there was no sound or light. I assume that there is none of the sort. The «old» Meter has its LOCATE button grayed out. Even on the Meter with LOCATE not grayed out, when enabled in the OSCILLOSCOPE screen, the light torch button is *not* present. This is inconsistent
6. Why isn't the iOS battery indicator visible on the app's screen? I need it!
7. I got an important «An important update is available for your Pokot Pro» when I started the 1.7.0 app some days after I had done the update proper. When I checked, this turned out to

have been an erroneous message

8. The Interval time is non-intentionally changed when touching the screen. Like 10 ms/div is easily changed to 9.89 ms/div just by pushing the curve up and down, with one finger. To reset it back to 10.0 ms/div one has to enter Mode then press 5 ms then press 10 ms again. It is not enough just to press 10 ms

SG 05Aug2024: «This should be improved in the next build (still not perfect).»

9. Also it is confusing to change while the «run wheel» is running. It seems like I have to stop the run wheel and then start it again to get the screen updated with correct time axis. The field to the left of the run wheel is updated ok. They don't correspond. I don't know what to say about this, other than it's not good at all. Things like this cast a dark shadow over the Pokit Innovations. Not very innovative, if you ask me! This seems to also be the case for the other settings, like Trigger, and its associated level setting

SG 05Aug2024: «This is fixed in the next build.»

10. I have a $32 \text{ ms} / 256 = 125 \text{ } \mu\text{s}$ max pulse as a starter in my DAC-output spectrum. I did get to see this when I set the scale as mentioned above. It should, since 1 MHz sampling is $1 \text{ } \mu\text{s}$, times Nyquist is $2 \text{ } \mu\text{s}$. $125 \text{ } \mu\text{s}$ is no problem. Fine. However, when I decrease the sampling speed, like to 10 ms/div this square pulse is seen as a pike. Decreasing again to 20 ms/div, this $125 \text{ } \mu\text{s}$ pulse is sometimes not hit by a sample, so it's not displayed. The Pro does not sample at 1 MHz, it samples at a time dependent on the screen resolution. **Any serious scope I have come across since 1990 samples at full speed always and then figures out what to present if there were a complete («invisible») pulse between two screen points. This is a serious problem, causing me not to be able to trust the values I see**

SG 05Aug2024: «Again the main limit here is BLE, in order to not take a million years to send the data we limit the sample rate in order to 1000 samples so if you have a sampling window of 1 second the actual sample rate is 1kHz.

Maximum sampling rate is still 1M samples/sec.

We plan to make this info more obvious to the user in the app.»

11. There is no «exit/quit app» button. I have to use the iOS push up out of the screen to stop it
12. Some time the measuring screen freezes. When I go to devices the LOCATE works and then back to the scope it's ok again.

SG 05Aug2024: «This should be fixed in the next build.»

13. Several error messages in the app kept reappearing so fast that I could not do the wanted action. I had to stop and start the app again. One is «Pokit App. OK» when I try to enable the Pokit Meter. Plus, I don't have any clue what this means. But I think it means that I cannot run the OSCILLOSCOPE function with the Meter. As used with the LOGGER or MULTIMETER they may be used

SG 05Aug2024: «I didn't quite understand the error you got here but it might be fixed in the next build (we fixed some random errors).»

14. It looks like I can enable only one Meter at a time
15. It looks like the display of the Meter's data with the LOGGER kind up «fills up» the screen forever, making the curve more and more dense. I can use two fingers to zoom in and out on the curve when I have stopped it. It seems like the design is to log every data, with no mode to see the «last 10 seconds». Fair enough

16. I don't know whether the Meter's LOGGER when detached from the app will log. They claim it will. But I haven't found the tutorial of this, which if found would be a selling point to me. And I don't know if the time axis may be seen in calendar time, or just seconds, minutes or hours after start
SG 05Aug2024: «The logging data is stored on the Pokit Pro/Meter when you close the app the Pokit Pro/Meter knows to keep sampling and when you reopen the app the app syncs the data to the latest data.»
17. **Continuous** and «**continuity**» are different things. The latter gives the beat sound on the Ohm-meter with shorted wires. See [7] at «Pokit User Guide – Multimeter – Continuity» and «To say there is continuity is to say that there is an electrical path between two points» at [8]
18. *SG 05Aug2024: «The next build for iOS is waiting on a review from Apple so hopefully should be released very soon (hopefully this week).»*

Communities / Help

The **Pokit community** is at [p_help](#). I have referenced some [p_help](#) above as well. But do **Expand All** (for browser searching in text folds) first, then do a «find» in your browser.

One can also raise tickets with Pokit support.

References

Wiki-refs: [Autonomous peripheral operation](#), [Bluetooth Low Energy \(BLE\)](#), [Over-the-air update \(OTA\)](#), [System on a chip](#)

- [1] **Uploading Firmware Images Using OTA DFU**, see [here](#)
- [2] **EFR32BG12 Gecko Bluetooth® Low Energy SoC Family Data Sheet**, see [here](#)
- [3] **EFR32 Blue Gecko 12 Software Documentation: PRS**, see [here](#)
- [4] –»–: **EMLIB**, see [here](#)
- [5] **2ARUE-POKPRO FCC ID Equipment: Pokit Innovations PTY. LTD. -POKPRO** see [here](#)
- [6] **Inspiring Dads: Interview with the Pokit Electrical Engineer**, «*My name is Stephen Geary, and I'm an electrical engineer for Pokit Innovations*», see [here](#)
- [7] **No exhaustive manual**, but there are **video tutorials** at <https://help.pokitmeter.com/hc/en-us/sections/360002899214-Tutorials>
- [8] **Measuring Ohms & Continuity** by *Jeff Rosenblum* (2019), see <https://www.famous-supply.com/measuring-ohms-and-continuity-02-12-2019>

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