How to run the emulator on the phone

This document describes how to run the emulator on the loop phone. It assumes you installed the emulator and verified it starts successfully according to the installation guide. The VDF instructions and files are not covered here again because they are identical to using the emulator on the PC.

Background

This is not the focus of this document but just recapitulating to set the scene. On the phone there is no graphical output and no PDF-file is created. All other files are created but remember they get recycled after each loop. If for example you want to inspect the CSV-file you have to be quick downloading it to the PC.

The main output is a table of key values per loop but for space reasons it holds less content than on the PC or in the CSV-file. It gets dynamically updated after each loop. The emulator auto-detects the interval between loop runs.

On the phone you do not input (a list of) logfiles but the emulator always analyses the current logfile which effectively means it analyses the loop that was executed a few seconds before. Therefore table columns labelled “orig” always refer to that active AAPS run.

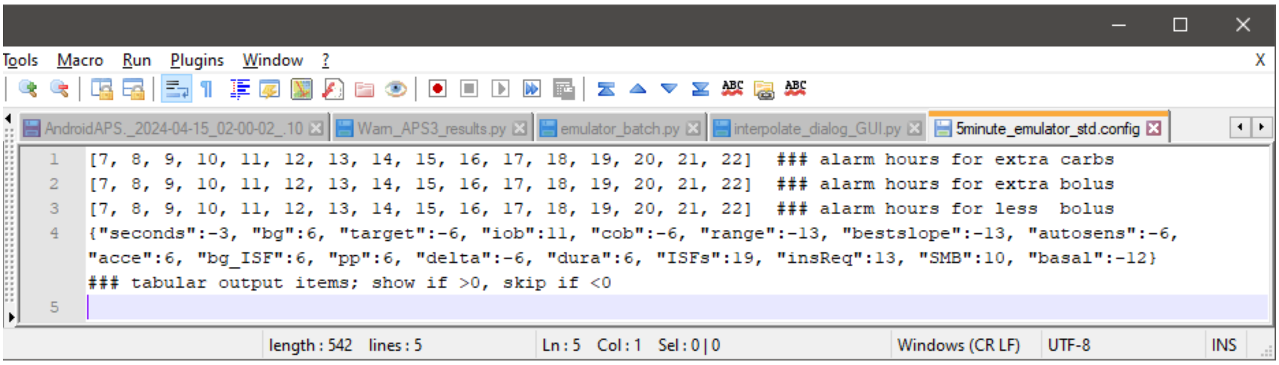
That said one purpose of running the emulator on the phone with a noChange.vdf is to have a running table of key values for the recent 15 loops. There you can inspect e.g. autoISF factors and what happened to insulin required at the time.

The other purpose is to compare a what-if scenario defined in your VDF-file. Whenever the what-if case results in a different SMB you can be notified via speech synthesis of the phone and you can decide whether to add that little extra bolus manually if the situation looks OK. Running that what-if scenario for a while you can build confidence in the modified settings and eventually adapt the AAPS settings accordingly. Of course you would run such a comparison with the active loop having the lower insulin need and the what-if settings having potentially higher insulin need.

Define the columns to be shown in the interactive table

This is the first step and prepares usage. You edit the standard config file from the installation to suit your phones capabilities and screen width. It also includes selections whether and when speech output is used to notify you about extra carbs required or SMBs deviating from those given or not in the master run.

Here is the content of the default config-file from the installation:


Tools
Macro
Run
Plugins
Window
?
X
AndroidAPS._2024-04-15_02-00-02_.10
Warn_APS3_results.py
emulator_batch.py
interpolate_dialog_GUI.py
5minute_emulator_std.config
length : 542   lines : 5
Ln : 5   Col : 1   Sel : 0 | 0
Windows (CR LF)
UTF-8
INS

```
1  [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]  ### alarm hours for extra carbs
2  [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]  ### alarm hours for extra bolus
3  [7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22]  ### alarm hours for less  bolus
4  {"seconds":-3, "bg":6, "target":-6, "iob":11, "cob":-6, "range":-13, "bestslope":-13, "autosens":-6,
   "acce":6, "bg_ISF":6, "pp":6, "delta":-6, "dura":6, "ISFs":19, "insReq":13, "SMB":10, "basal":-12}
   ### tabular output items; show if >0, skip if <0
5  
```

Row 1 is used to define at which hours you allow speech notification in case extra carbs are required. Within the square brackets list the allowed full hours and leave those out when you do not want to be disturbed. No entry at all within those brackets suppresses announcements all day.

Row 2 has the equivalent structure and defines allowed hours for announcing an extra bolus.

Row 3 has the equivalent structure and defines allowed hours for announcing when the SMB would have been less than in the active loop.

Row 4 is a json definition for the selection of columns to be shown. Do not change the structure of the special character. The only thing to do is changing the sign of the numbers. Negative numbers mean do not show, positive numbers mean include it in the table. The absolute number says how many columns that will occupy on the screen.

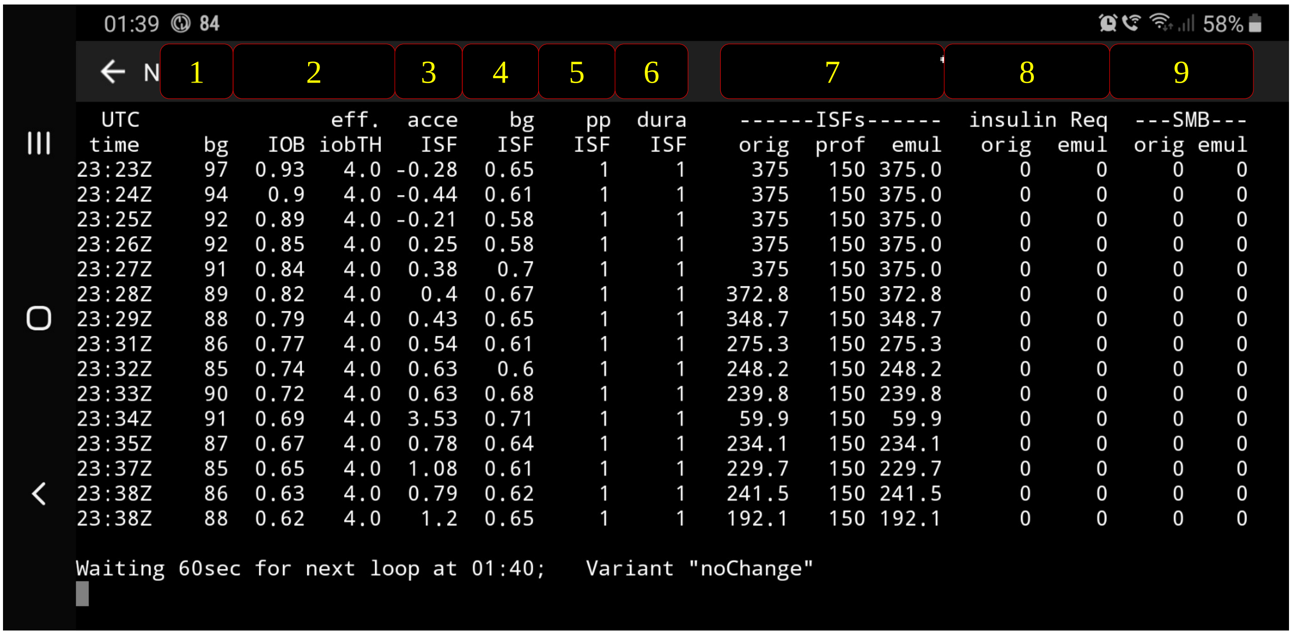
For example “seconds”:-3 means do not show seconds part of the time stamp. It would cost you 3 columns which for some phones may not fit into a single line even in landscape orientation. With Libre 1 minute loops I like to have seconds shown, i.e. “seconds”:3 in my case. That just fits into my current 93 column display.

All available columns or column groups are listed in the above config file and their labels are (occasional numbers in parentheses refer to the labels in the screen shot below):

- **seconds** useful in 1 minute CGMs
- **bg** (1) nearly always shown
- **target** not in default
- **iob** (2) includes IOB and the effective iobTH
- **cob** not useful in FCL mode
- **range** basic duration and average as input for dura_ISF
- **bestslope** linear fit for recent history; for research, not used so far in regular autoISF
- **autosens** factor, less useful with autoISF
- **acce** (3) or **acce_ISF** the emulated acce_ISF factor
- **bg_ISF** (4) the emulated bg_ISF factor

- **pp** (5) or **pp_ISF** the emulated pp_ISF factor
- **dura** (6) or **dura_ISF** the emulated dura_ISF factor
- **ISFs** (7) group of 3 ISF or sens values: orig run, profile base definition, emulated value
- **insReq** (8) insulin required for original and emulated variant
- **SMB** (9) SMBs for original and emulated variant
- **basal** basal rates for original and emulated variant

Here is a screen shot of these default columns for a 5 minute CGM layout although created with a 1 minute CGM:



```
  UTC                eff.  acce    bg    pp  dura   ------ISFs------  insulin Req  ---SMB---
 time      bg   IOB iobTH   ISF   ISF   ISF   ISF    orig  prof  emul  orig  emul  orig emul
23:23Z     97  0.93   4.0 -0.28  0.65     1     1     375   150 375.0     0     0     0    0
23:24Z     94   0.9   4.0 -0.44  0.61     1     1     375   150 375.0     0     0     0    0
23:25Z     92  0.89   4.0 -0.21  0.58     1     1     375   150 375.0     0     0     0    0
23:26Z     92  0.85   4.0  0.25  0.58     1     1     375   150 375.0     0     0     0    0
23:27Z     91  0.84   4.0  0.38   0.7     1     1     375   150 375.0     0     0     0    0
23:28Z     89  0.82   4.0   0.4  0.67     1     1   372.8   150 372.8     0     0     0    0
23:29Z     88  0.79   4.0  0.43  0.65     1     1   348.7   150 348.7     0     0     0    0
23:31Z     86  0.77   4.0  0.54  0.61     1     1   275.3   150 275.3     0     0     0    0
23:32Z     85  0.74   4.0  0.63   0.6     1     1   248.2   150 248.2     0     0     0    0
23:33Z     90  0.72   4.0  0.63  0.68     1     1   239.8   150 239.8     0     0     0    0
23:34Z     91  0.69   4.0  3.53  0.71     1     1    59.9   150  59.9     0     0     0    0
23:35Z     87  0.67   4.0  0.78  0.64     1     1   234.1   150 234.1     0     0     0    0
23:37Z     85  0.65   4.0  1.08  0.61     1     1   229.7   150 229.7     0     0     0    0
23:38Z     86  0.63   4.0  0.79  0.62     1     1   241.5   150 241.5     0     0     0    0
23:38Z     88  0.62   4.0   1.2  0.65     1     1   192.1   150 192.1     0     0     0    0

Waiting 60sec for next loop at 01:40;   Variant "noChange"
```

You will probably end up with various config-files for different scenarios e.g. one without any speech announcement for when you are in concert or other occasions in quiet surroundings. Another approach could be running the emulator multiple times in parallel with different output columns to get a full picture or with two different what-if scenarios.

All config-files are stored in the AAPS logfile folder to be visible to the emulator.

Navigate through the initial dialogue

On the phone press the „QPython3L“ button created during installation. There, press Programs, select „emulator_batch.py“ and finally select „Run“.

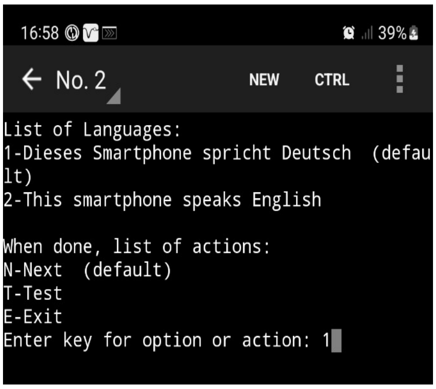
After some Android12 update the previously used GUI dialogues no longer worked and I had to create a keyboard based version similar to the typical telephone dialogues “for option X dial 2”. This dialogue system consists of two parts:

- The top part has numerical keys for each option that can be selected. One of those options has (default) at the end of the line which indicates that this option is the current selection. If you enter a different number the dialogue screen is redrawn and that indicator moved to your new selection. Once your intended selection is OK you focus on the …
- bottom part, which has letters as keys for the action to be selected. Again, the (default) indicator highlights what would be done next if you just press enter without any digit or any letter. Those actions typically are Next, Test and Exit.

The first dialogue is used to select the **language** for the speech synthesis.

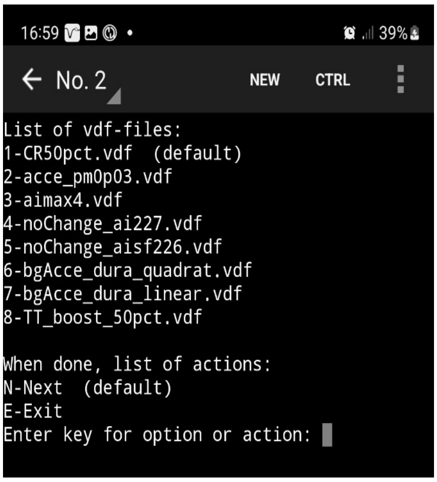
Select „Test“ to listen to a sample speech synthesis.

Select „Next“ to proceed.



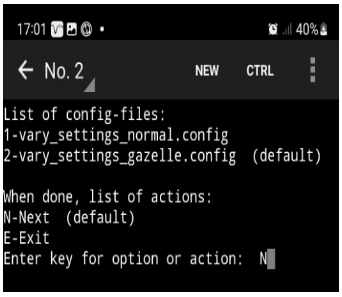
```
List of Languages:
1-Dieses Smartphone spricht Deutsch  (defau
lt)
2-This smartphone speaks English

When done, list of actions:
N-Next  (default)
T-Test
E-Exit
Enter key for option or action: 1
```

The next dialogue is for selecting your **variant definition file**. All vdf-files found in the logfile folder will be listed.

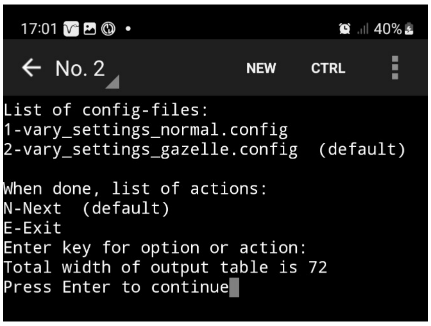


```
List of vdf-files:
1-CR50pct.vdf  (default)
2-acce_pm0p03.vdf
3-aimax4.vdf
4-noChange_ai227.vdf
5-noChange_aisf226.vdf
6-bgAcce_dura_quadrat.vdf
7-bgAcce_dura_linear.vdf
8-TT_boost_50pct.vdf

When done, list of actions:
N-Next  (default)
E-Exit
Enter key for option or action: 
```

The last dialogue is used to select your favourite **configuration file** with the content discussed in the preceding section.



```
List of config-files:
1-vary_settings_normal.config
2-vary_settings_gazelle.config  (default)

When done, list of actions:
N-Next  (default)
E-Exit
Enter key for option or action:  N
```

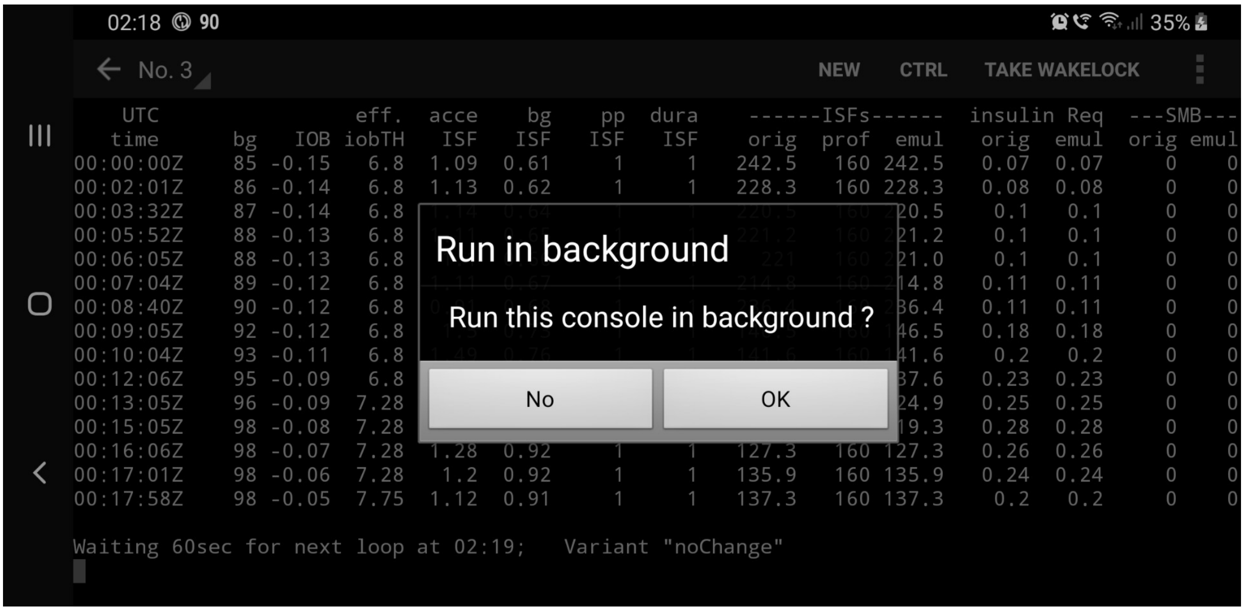


```
List of config-files:
1-vary_settings_normal.config
2-vary_settings_gazelle.config  (default)

When done, list of actions:
N-Next  (default)
E-Exit
Enter key for option or action:
Total width of output table is 72
Press Enter to continue
```

After you activate the selection you get an informational message of how many columns the selected tabular output will occupy. Before activating the ”N(ext)” selection now is a convenient time to rotate the phone to landscape to prepare for the multi column result table display.

Stop the emulator or switch between several python scripts running at the same time

Often I use other python scripts at the same time. As mentioned before you may want to run a second instance of the emulator with a different vdf-file. That is perfectly possible. **To start another python script** - or the emulator again with other parameters – press the phones RETURN button. A Two buttons dialogue comes up:



02:18 90 35%

← No. 3

```
     UTC                   eff.  acce    bg    pp  dura    ------ISFs------   insulin Req   ---SMB---
    time        bg    IOB iobTH   ISF   ISF   ISF   ISF    orig  prof  emul   orig  emul   orig emul
00:00:00Z       85 -0.15    6.8  1.09  0.61     1     1   242.5   160 242.5   0.07  0.07      0    0
00:02:01Z       86 -0.14    6.8  1.13  0.62     1     1   228.3   160 228.3   0.08  0.08      0    0
00:03:32Z       87 -0.14    6.8                                       220.5    0.1   0.1      0    0
00:05:52Z       88 -0.13    6.8                                       221.2    0.1   0.1      0    0
00:06:05Z       88 -0.13    6.8                                       221.0    0.1   0.1      0    0
00:07:04Z       89 -0.12    6.8                                       214.8   0.11  0.11      0    0
00:08:40Z       90 -0.12    6.8                                       236.4   0.11  0.11      0    0
00:09:05Z       92 -0.12    6.8                                       146.5   0.18  0.18      0    0
00:10:04Z       93 -0.11    6.8                                       141.6    0.2   0.2      0    0
00:12:06Z       95 -0.09    6.8                                        37.6   0.23  0.23      0    0
00:13:05Z       96 -0.09   7.28                                        24.9   0.25  0.25      0    0
00:15:05Z       98 -0.08   7.28                                        19.3   0.28  0.28      0    0
00:16:06Z       98 -0.07   7.28  1.28  0.92     1     1   127.3   160 127.3   0.26  0.26      0    0
00:17:01Z       98 -0.06   7.28   1.2  0.92     1     1   135.9   160 135.9   0.24  0.24      0    0
00:17:58Z       98 -0.05   7.75  1.12  0.91     1     1   137.3   160 137.3    0.2   0.2      0    0

Waiting 60sec for next loop at 02:19;   Variant "noChange"
```

Run in background

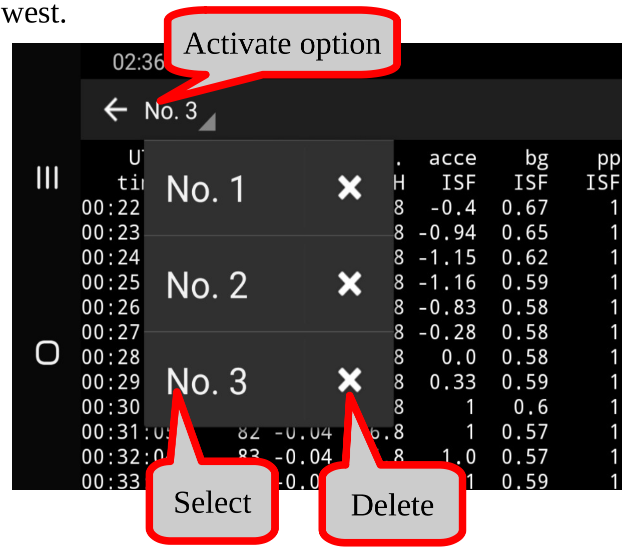
Run this console in background ?

- No means the current script will be stopped when a new one is selected
- OK means the current script continues and the new one will be added.
- The phones RETURN button acts as cancel and will disregard this screen and return to the current script

After pressing the YES button you will be back to select your script like emulator_batch.py and go through the dialogues. While it is active you see a counter in the top left corner of the screen. It tells you to which of the active scripts the current screen belongs. The other scripts are still in normal execution and can give spoken alarms, etc.

To **switch the display** between the python scripts press the No. field top left. It will list the active scripts by ID where “1” is the oldest down to the newest.

- Pressing the number will **switch to that script**.
- Pressing the X next to the ID will **stop that script** and it disappears from the list.
- Pressing the phones RETURN button will cancel the selection and stay with the current script



02:36

← No. 3

```
    U                .   acce    bg    pp
  ti                 H    ISF   ISF   ISF
00:22                8   -0.4  0.67     1
00:23                8  -0.94  0.65     1
00:24                8  -1.15  0.62     1
00:25                8  -1.16  0.59     1
00:26                8  -0.83  0.58     1
00:27                8  -0.28  0.58     1
00:28                8    0.0  0.58     1
00:29                8   0.33  0.59     1
00:30                8      1   0.6     1
00:31:0     82 -0.04  6.8      1  0.57     1
00:32:0     83 -0.04   .8    1.0  0.57     1
00:33         -0.0       1  0.59     1
```

Recover from errors and tips for trouble shooting

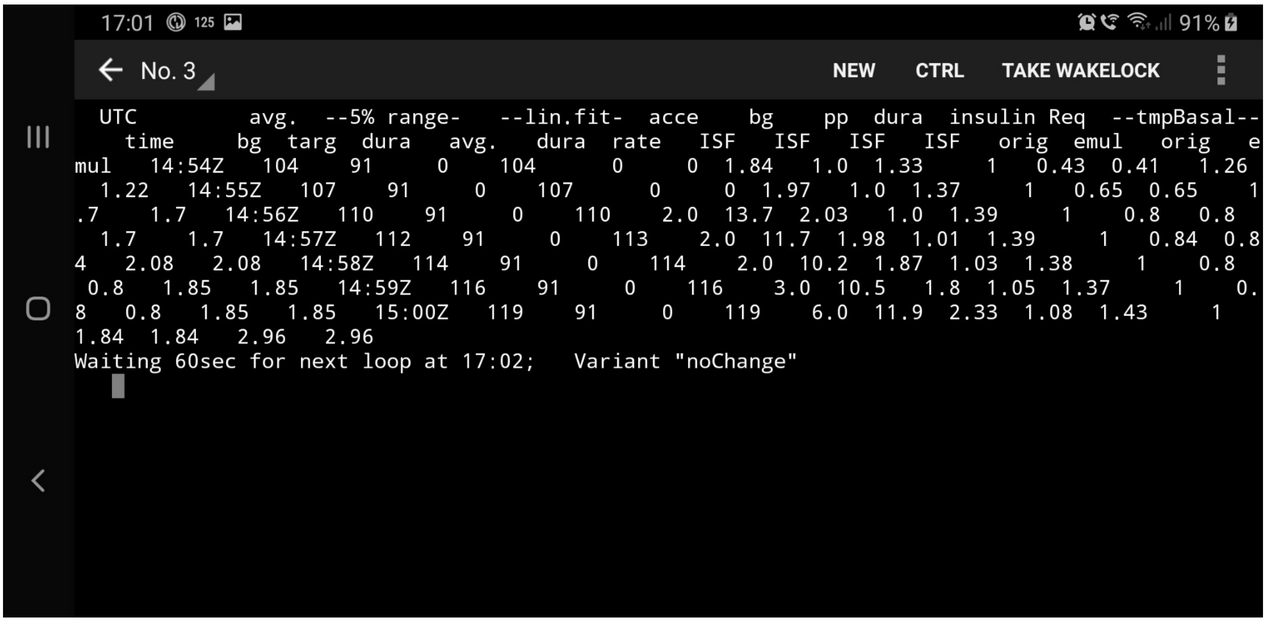
More or less by trial and error I found these methods of recovering from funny states.

Jagged alignment of columns

When tiling the phone between portrait and landscape mode the nice column layout in landscape sometimes is lost. It mainly happens when still in portrait orientation while the result table is already printed.

- Tip 1: put phone in landscape at the end of the input dialogue before your last ENTER action
- Tip 2: sadly you just need to wait in landscape mode until the next loop is run and the table is updated. Slight advantage for Libre 1 minute users!

Here is such an example trying to show those columns which are not included in the standard configuration:



```
  UTC         avg.  --5% range-   --lin.fit-  acce    bg    pp  dura  insulin Req  --tmpBasal--
    time     bg  targ  dura   avg.   dura  rate   ISF   ISF   ISF   ISF   orig  emul   orig   e
mul   14:54Z   104    91     0    104      0     0  1.84   1.0  1.33     1   0.43  0.41   1.26
  1.22   14:55Z   107    91     0    107      0     0  1.97   1.0  1.37     1   0.65  0.65    1
.7    1.7   14:56Z   110    91     0    110    2.0  13.7  2.03   1.0  1.39     1    0.8   0.8
  1.7    1.7   14:57Z   112    91     0    113    2.0  11.7  1.98  1.01  1.39     1   0.84  0.8
4   2.08   2.08   14:58Z   114    91     0    114    2.0  10.2  1.87  1.03  1.38     1    0.8
 0.8   1.85   1.85   14:59Z   116    91     0    116    3.0  10.5   1.8  1.05  1.37     1    0.
8   0.8   1.85   1.85   15:00Z   119    91     0    119    6.0  11.9  2.33  1.08  1.43     1
1.84  1.84   2.96   2.96
Waiting 60sec for next loop at 17:02;   Variant "noChange"
```

error messages

If you run into an error message and do not understand how to recover from it then make a screen shot and send it to me.

clearing the on screen keyboard

The best method I found for hiding the keyboard is pressing the phones RETURN key.

The opposite case can also happen, i.e. the dialogue asks for input but the keyboard is not displayed. When I press the first desired key it usually comes up.

qpython3 disappeared from active app list

Depending on Android version and hardware it can happen that qpython3 disappears from the list of active apps although it still runs. In such case I press the qpython3 icon on the phones home or app screen as if I want to start it again. Either it comes up directly or it starts with the usual selection of python programs. I just go through that dialogue until I get the app screen where I can then use the delete method to kill any duplicate instance.