

1. Overview

Pager is an open source application for SMS control of hardware devices. Used with the Turbo family of SIM Toolkit adapters it provides very flexible and price sensitive solution with comfortable user configuration.

2. Features

- 13 Digital I/O, 4 usable as ADC Inputs
- Highly flexible, easy to configure, comfortable user interface
- SMS Alarms for both digital and analog inputs, configurable digital and analog threshold
- SMS control, commands for On/Off, Button and State functionality
- Security with configurable list of allowed phone numbers
- Open source, free software

3. Usage

There are two items in the **Pager** menu:

- **Numbers** - to set up the list of allowed phone numbers
- **Config** - to configure the pins

3.1. Pin setup

The pin setup requires following steps:

1. **Label pin** - set the name of the pin
2. **Set function** - digital input/output or ADC input if applicable
3. **Set ON Level and RESET Value** - only in case the pin is set to be output
4. **Alarm** – only in case the pin is digital or ADC input

The first required step is to label one or more pins - they become “active” in the sense that they can be controlled via SMS and are visible in **Pager->Config->State**. We suggest to call them relatively to the pin usage, e.g. Light, AirCon, etc.. The label has to be one word - no space is allowed.

The second required step is to set the direction/function of the pin - it can be either digital input, digital output or in case of pins 1-4 also ADC input.

In case the pin is set to be output it is possible to specify what is the electrical level of ON - whether 0 (=0V) or 1 (=3/5V depending on mobile equipment). Further it is possible to specify the RESET value - the level set when the system is turned on, and also to control the current value.

3.2. Phone number configuration

To provide the security to SMS control it is possible to specify the list of phone numbers that can send the control/state SMS commands.

Warning. In case there is no phone number set then everybody is allowed to control the pager.

To enter new phone number use the **Pager->Numbers->New Number** item. To delete the number use the **Pager->Numbers->"Number"->Delete** item.

3.3. Alarm functionality

Every digital or analog input can trigger SMS alarm. The pin value is tested every STATUS APDU, usually every 30 seconds (can be less on some phones and can be configured via SIM Toolkit command POLL INTERVAL).

To turn alarm on use the **Pager->Config->"PIN"->Alarm** item. If set to **Yes** then there are new items visible:

- **Level** – in case of digital input it is the value (=0/1) that triggers alarm, in case of ADC input it is **<=Threshold** or **>Threshold**.
- **Threshold** – only for ADC input.

Alarm SMS is sent to all configured numbers.

3.4. SMS commands

There are 3 SMS commands, all of them are case insensitive for keyword as well as for label, only one space is allowed:

- **ON label** - set output of given label ON
- **OFF label** - set output of given label OFF
- **BTN label** - negate current value of output of given label for a delay¹, then set the value back

¹ The length of delay is a compile time option, see **Compilation Options**.

The response on SMS command is the operation itself and SMS answer with current state of pins. **The answer is sent always**, even if there was an error (syntax, pin is not output) processing the command. **It means that to get the current state of pins just send any SMS, e.g. empty.**

Note on SMS memory

For pager application to receive the SMS commands **it is required that the mobile equipment stores the incoming message on the SIM card**. Mobile equipment with internal SMS memory can use various strategy on SMS storing, some use the internal memory first, while other use the SIM memory until it is not full. In case of mobile equipment having and using the internal memory first it is necessary to fill this memory. The best scenario is to use data cable or store outgoing messages without sending, and then delete messages from SIM card. To delete all the messages stored on SIM card use the menu item **Pager->Config->Clear SIM SMS**.

The **Pager** application deletes **all the incoming messages** and keeps the SIM SMS memory free.

4. Compilation Options

There are two defines that can be modified for compilation in `config.h`:

- `CONFIG_TURBO_LITE`
- `CONFIG_BTN_DELAY_MILISEC`

The `CONFIG_TURBO_LITE` controls whether the pins 1-4 should be offered in the configuration menu (these pins are not available on the **Turbo Adapter** connector). It is safe to use the Pager application configured and compiled for **Turbo Lite** in **Turbo Adapter**, it is just cosmetics. To compile the application for **Turbo Lite** leave this define uncommented, or comment it out for **Turbo Adapter**.

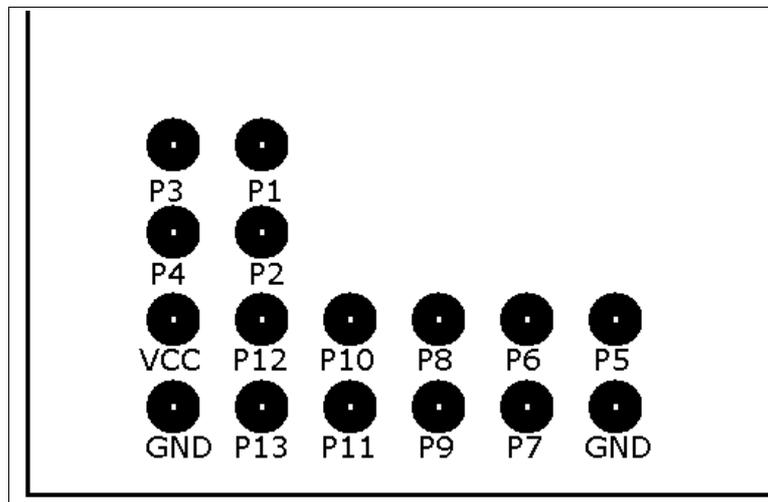
The `CONFIG_BTN_DELAY_MILISEC` sets the **BTN command delay** (default value is 500 ms).

Note 1. Because the clock is mobile equipment dependent the time does not have to be precise. In case you wanted precise timing you can tweak the value for the specific mobile equipment.

Note 2. Do not set the delay to be longer than about 2 seconds - the maximum time required for SIM/Turbo to answer the mobile equipment.

5. Technical

Turbo Lite Pinout



Turbo Pinout



Pin Description

Turbo Lite Pin	Turbo Pin	ATmega128 Pin	Function
P1	N.A.	PF2	ANALOG I / DIGITAL I/O
P2	N.A.	PF5	ANALOG I / DIGITAL I/O
P3	N.A.	PF3	ANALOG I / DIGITAL I/O
P4	N.A.	PF6	ANALOG I / DIGITAL I/O
P5	27	PG1	DIGITAL I/O
P6	31	PC2	DIGITAL I/O
P7	30	PC1	DIGITAL I/O
P8	35	PC6	DIGITAL I/O
P9	33	PC4	DIGITAL I/O
P10	39	PA7	DIGITAL I/O
P11	36	PC7	DIGITAL I/O
P12	42	PA4	DIGITAL I/O
P13	40	PA6	DIGITAL I/O