

## M851 Power Consumption Considerations

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The M851 microcontroller normally operates at low-power mode at 32768 Hz. Coupled with a sleep mode during inactivity, this extends the operational life of the watch.

Certain watch operation require a much higher processing speed to complete the task. For these operations, the M851 OS will automatically switch to a high-power mode running at 2MHz through the High-Speed Oscillator module or HSO. This high-power mode of the microcontroller will drain the battery at a much faster rate.

The following operations automatically activate the high power mode of the watch:

- **Scrolling.** This will turn on the HSO for the duration of the 32 Hz interrupt.
- **Blinking.** This will turn on the HSO for the duration of the 32 Hz interrupt.
- **Switch and Crown events.** This will turn on the HSO for 5 seconds.
- **Mode and State change.** This will turn on the HSO for 5 seconds.
- **Background Tasks.** This will turn on the HSO until all the background tasks are complete.
- **STP Resource Update.** This will turn on the HSO for the duration of the 32 Hz interrupt.
- **TMR Resource Update.** This will turn on the HSO for the duration of the 32 Hz interrupt.
- **SYN Resource Update.** This will turn on the HSO for the duration of the 32 Hz interrupt.
- **Database access from EEPROM.** This involves the following:
  - reading and writing a record to a database file;
  - swapping background handler code of a WristApp;
  - loading common and state handler code for a WristApp;
  - loading a periodic task during minute, hour or day updates of the primary TZ;
- **Hour and Day Rollover of the primary time zone.** This will turn on the HSO only for the duration to complete the tasks associated with hour and day rollovers. These activities are: periodic task execution; update the AP flag; update the ALARM\_CLOCK flag; update the timeline resource; display new primary time data; etc.

Other power hungry hardware modules in the M851:

- EL
- Buzzer
- EEPROM

The M851 OS keeps track of the active systems (both hardware and software) and will automatically return to low power mode when HSO is not required. It also has built-in

code to handle simultaneous usage of the EL, buzzer and EEPROM to prevent too much drain in the battery that might cause a watch reset due to low voltage.

Even with the built-in code to reduce power consumption, the M851 OS cannot predict nor compensate how a third-party developer will use the M851 through the WristApp or Periodic Task. The following items below should be considered when designing WristApps (and Periodic Tasks) for the M851:

- If a continuous scrolling is required for a WristApp, auto-return to TOD should be active by using the macro `CORE_SET_AUTORETURN`. This will limit the scrolling for only 2-3 minutes after idle activity.
- Make sure that a background task will end.
- For background task that is processing a large database. Make sure that background task will process only a section of data at a time to allow the M851 OS to process other pending tasks in the system.
- Turn off the STP, TMR and SYN resource when not needed. The resource will automatically stop when their working values reaches maximum. For example, an STP resource will stop after 100 hours.
- Always close a database file (using the macro `DB_CLOSE_FILE`) when file is complete or not required.