

META WATCH

DIGITAL WATCH (WDS112)

USER GUIDE

Document Version 1.0

Digital Watch Firmware v0.7.8



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1 Introduction

This document is a User Guide for the Meta Watch Digital Watch Firmware for the Wearable Development System (model WDS112). This Meta Watch system is for developers and so you might find the instructions and the user interface to show some technical information that is useful to developers, but is not required for a consumer product. If you do use Meta Watch to create a consumer grade product, please be aware of your audience, this code is meant to be used as a starting point for you.

1.1 REVISION HISTORY

Date	Change Description	Revision

Table 1: Revision History

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2 Starting Up

2.1 YOUR METAWATCH PROGRAMMING CLIP

Your Meta Watch development system comes with a programming clip (model AU0010) that attaches to the watch connecting the four waterproof pins on the back to a Texas Instruments Flash Emulation tool that we put inside the clip. The micro USB socket of the clip allows you to plug your watch into a USB hub or any 5V USB power source to recharge. When connected to a Personal Computer that supports the Flash Emulator USB drivers, you are able to reflash, debug, and program your watch.



Connect the clip to the watch, plug in the USB cable (a micro USB cable is supplied in the box for you) and plug the other end into a USB power supply. The watch is designed to recharge from this micro USB port and operate from this power supply while charging.

Plug the watch in and let it charge to a full battery (around 4 hours).

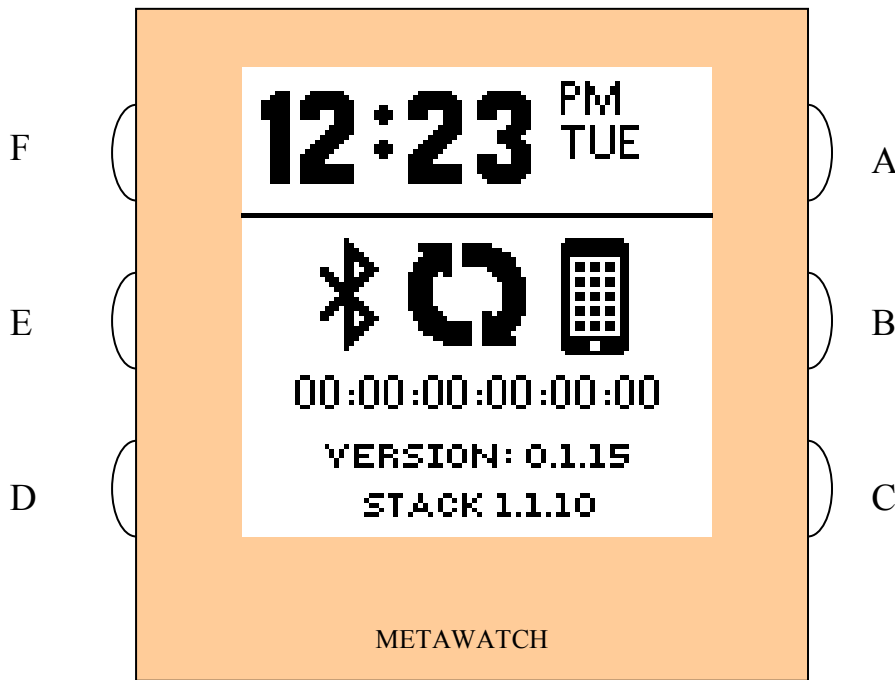
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2.2 WATCH SOFTWARE VERSION

This document is for Watch Application Firmware version 0.7.28

2.3 WATCH BUTTON MAP

Buttons are labelled A-F clockwise starting from the top right (2 o'clock).



2.4 WATCH FIRST BOOT AND SETUP

If your watch had a low battery, when you opened the box, the display should turn on and the watch should boot. If not, check the Trouble Shooting section.

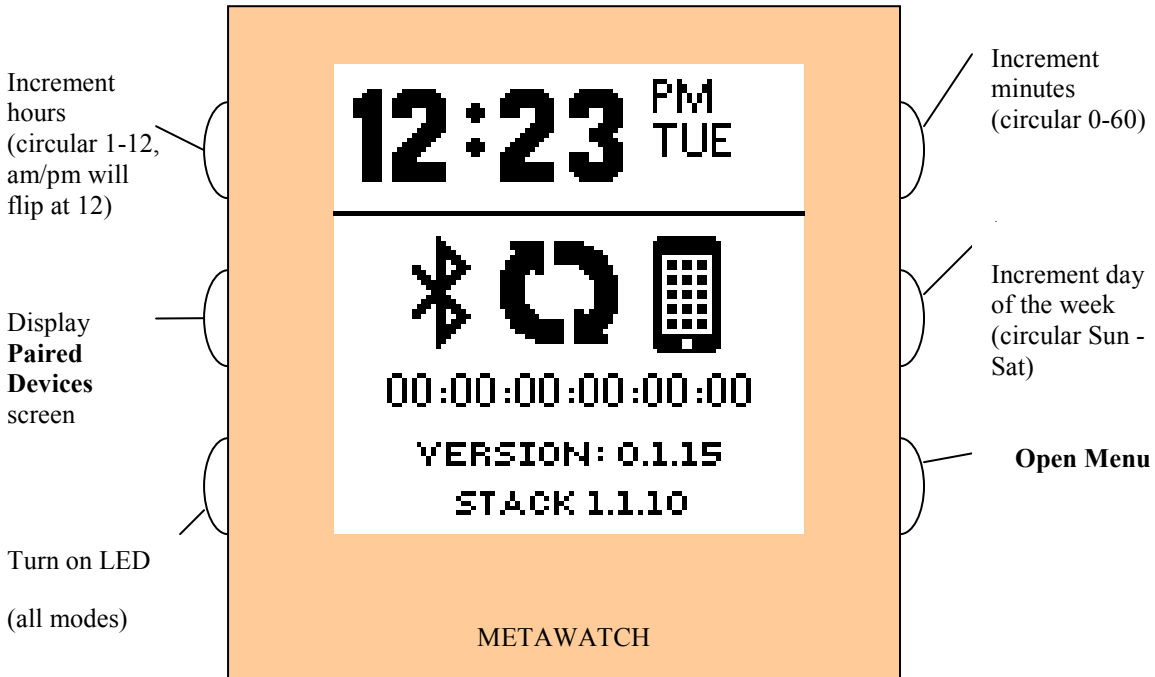
When booting and stack initialization is complete, there are different actions based on whether there is pairing information in Flash. We expect a new watch from the factory to have no pairing information in it.

2.4.1 Watch initialization actions when no pairing information is present.

- The watch's Bluetooth radio immediately becomes discoverable and connectable (Also called Pairing mode). This means you can discover the watch through a Bluetooth device search.
- The watch will stay this way indefinitely until the Bluetooth radio is manually turned OFF. (this is default and can be changed)
- The watch will then move directly to the Idle mode display with the system clock displayed.
- In the phone buffer area (below the time) of the Idle display, an indication that the watch is in pairing mode is shown.

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- e. A “set time” user interface that is not part of the standard interface when paired is available. This allows some limited use as a clock until such time as the connection is established and a protocol message to set the real time clock of the watch is sent.

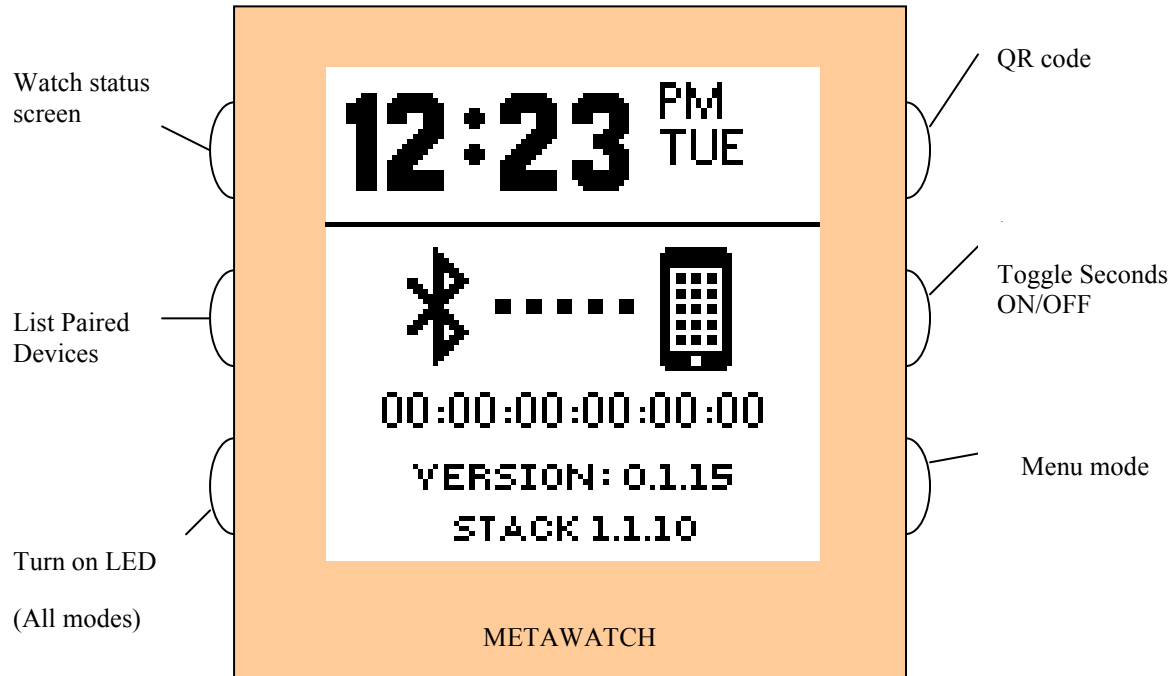


Idle User Interface with no paired device. This screen shows the watch is in pairing mode after the first boot.

2.4.2 Watch initialization actions when there is pairing information present.

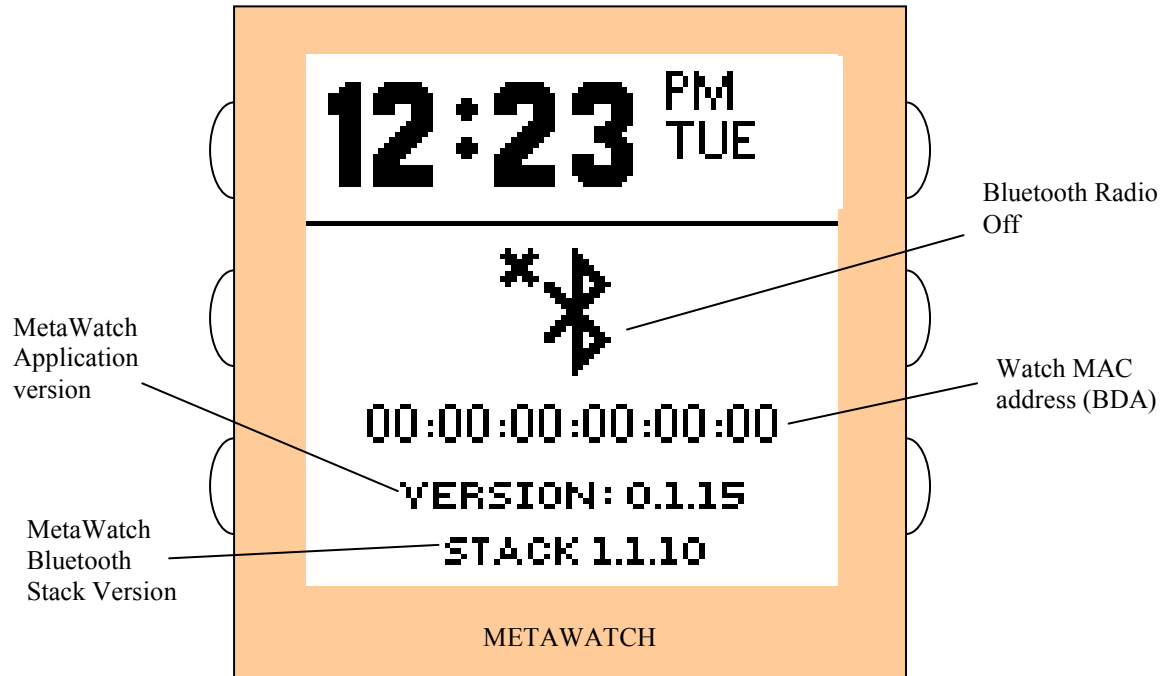
- a. The watch immediately becomes connectable, but not discoverable.
- b. The watch will stay this way indefinitely until the Bluetooth radio is manually turned OFF. (this is default and can be changed)
- c. The watch will move directly to the Idle display with the system clock.
- d. In the phone area of the Idle display, an indication that the watch is waiting for a phone connection will stay on until connected or the radio is turned off.

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Idle UI, with pairing information and not connected

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This screen shows the watch with no pairing information and the Bluetooth radio turned OFF.

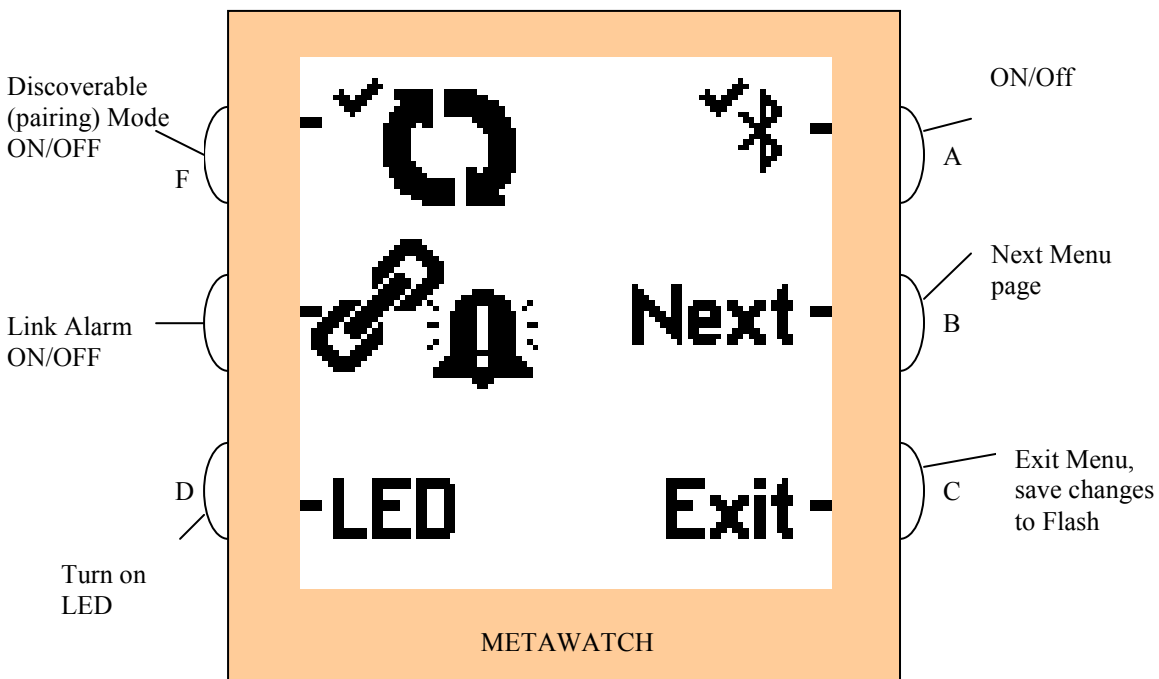
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2.5 WATCH MENU AND PREFERENCES

The Menu button will open a simple preferences menu. The Menu stays open until exited. The changed values save to Flash on exit.

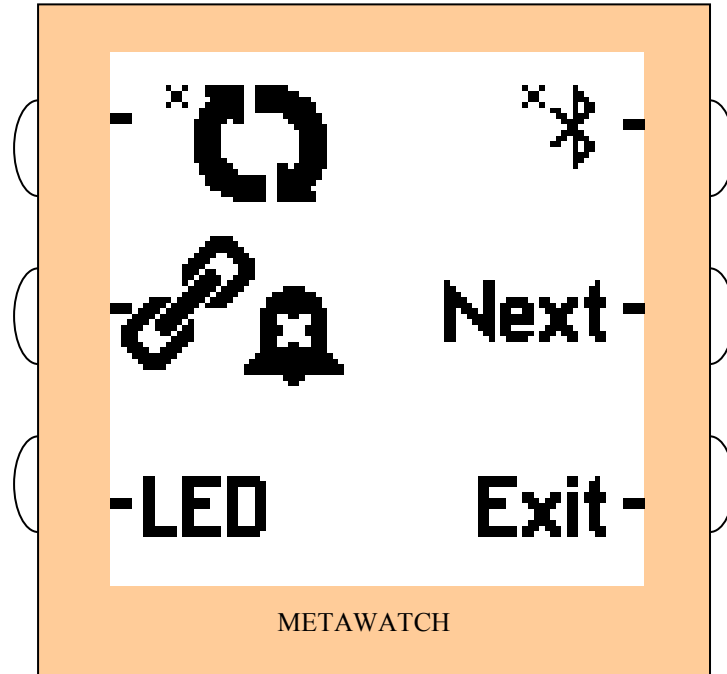
2.5.1 Menu Page 1 Description of Options

- **Bluetooth ON/OFF** – Toggles between the Bluetooth radio ON and OFF. When ON, the watch can accept a Serial Port Profile connection from any paired device. When OFF, the radio and Bluetooth protocol stack is shutdown completely. Turning Bluetooth OFF when not using the watch for long periods of time saves a lot of battery power. When turned ON from the OFF position, the Icon will show a “wait” state for the duration of the radio initialization process.
- **Next Menu Page** – Goes to Page 2 of the Menu
- **Exit Menu** – Exits the Menu, saves all changes to Flash memory, returns the watch to the Idle screen.
- **Turn on LED** – Turn the LED ON for the default time.
- **Link Alarm ON/OFF** – When set to ON, you get a vibration alert and a visual message when the watch loses connection with the phone. One common reason the link between the watch and the phone is lost is that the phone is too far away, which could indicate that you left your phone behind.
- **Discoverable Mode ON/OFF** – When set to ON the watch can be discovered for the purposes of pairing with another device. If Bluetooth is OFF, then Bluetooth will be turned back on when Discoverable Mode is turned ON. When turned ON from the OFF position, the Icon will show a “wait” state for the duration of the radio initialization process.



Menu Mode page 1 with all items ON

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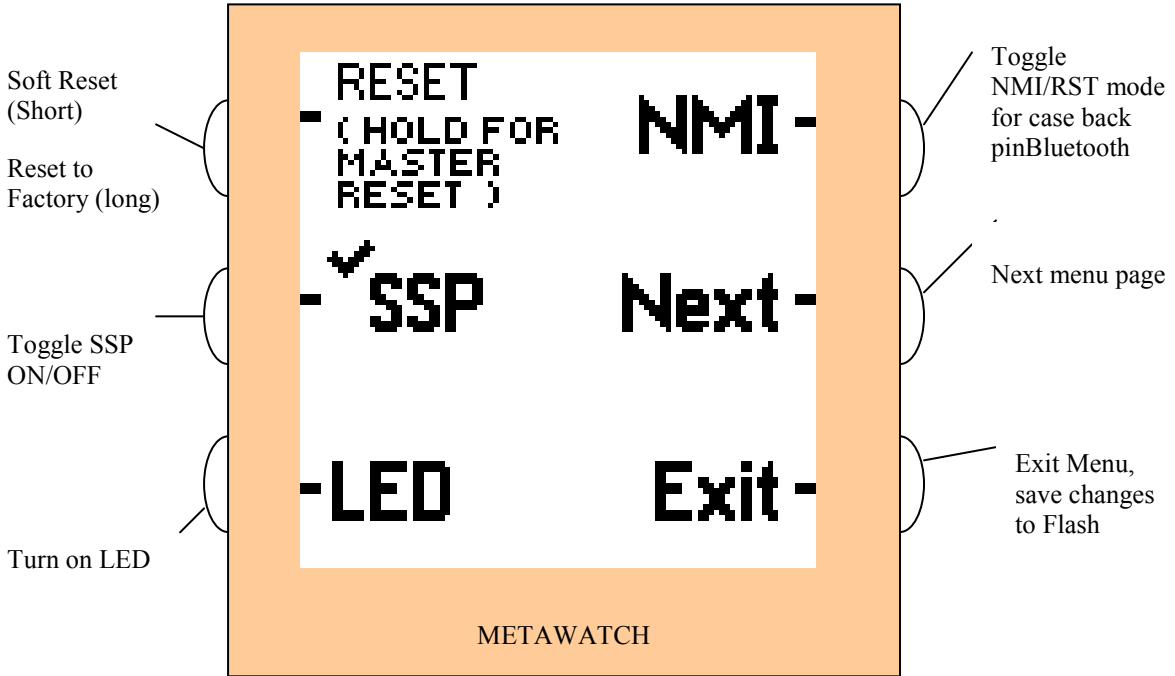


Menu Mode page 1 with all items OFF

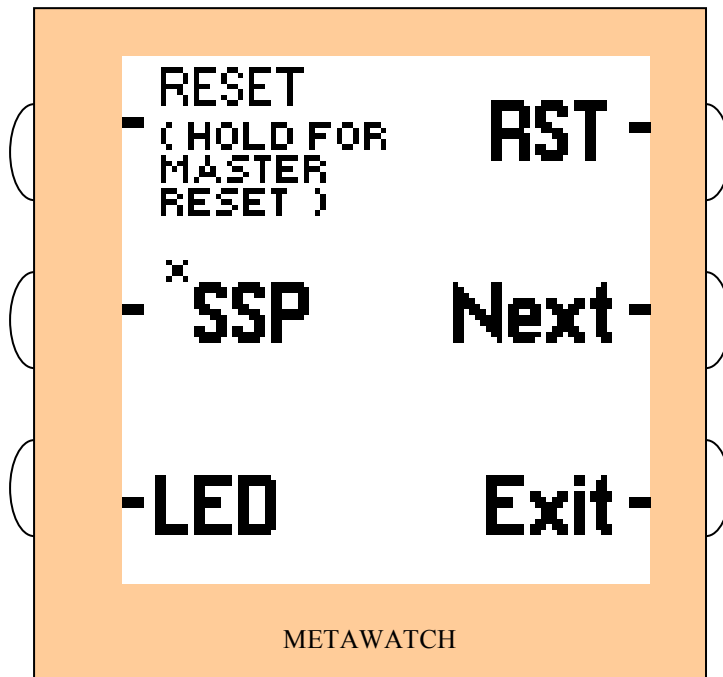
2.5.2 Menu Page 2 Description of Options

- **NMI / RST** – Toggles between the Non-Maskable-Interrupt mode and Reset mode of one of the JTAG pins on the case back. When set to NMI (default), no accidental reset can take place. When set to RST, the pin becomes an active Reset pin for the MSP430 microcontroller. This can be useful when debugging and testing as it provides an easy way to reset the watch in the field.
- **Next Menu Page** – Goes to Page 3 of the Menu
- **Exit Menu** – Exits the Menu, saves all changes to Flash memory, returns the watch to the Idle screen.
- **Turn on LED** – Turn the LED ON for the default time.
- **SSP ON/OFF** – SSP stands for Secure Simple Pairing. This is a different pairing and security standard for Bluetooth radios. At the moment, this option is not fully implemented and not stable. It is OFF by default.
- **Reset (Hold for Master)** – A short press will soft reset the watch. All information saved in Flash memory is retained including the paired devices. If you press and hold for 10 seconds and release, then the watch will go through a Master Reset process where all Flash memory returns to the original factory state, including removal of the paired devices.

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Menu Mode Page 2 with all items ON

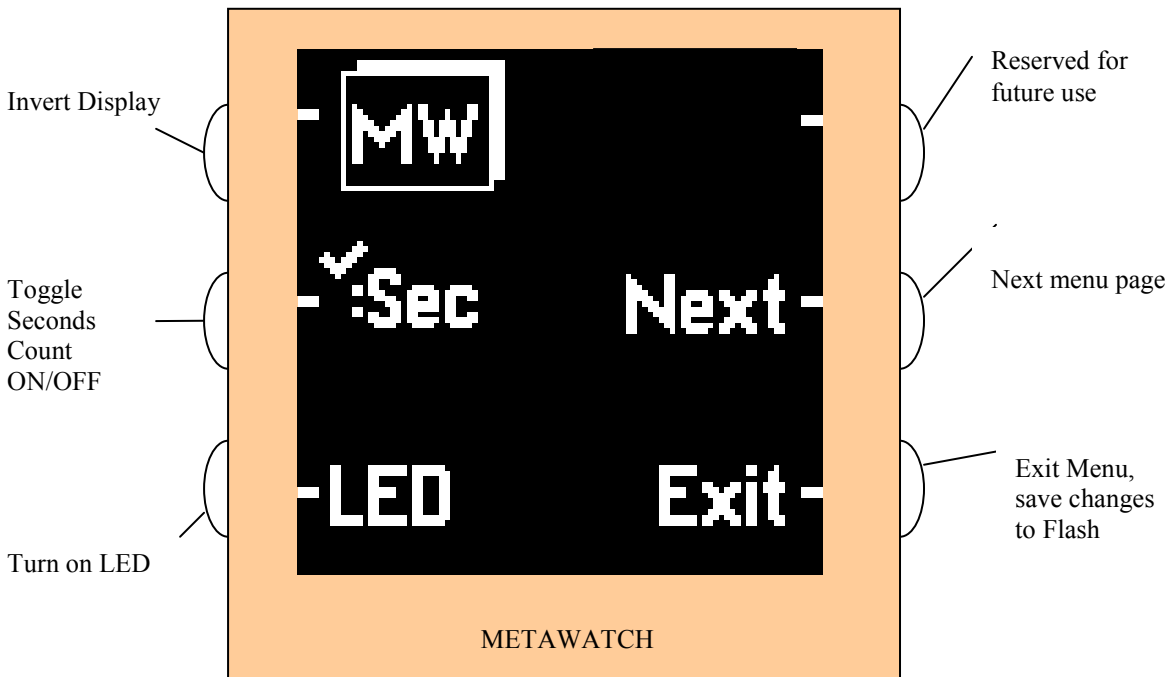


Menu Mode Page 2 with all items OFF

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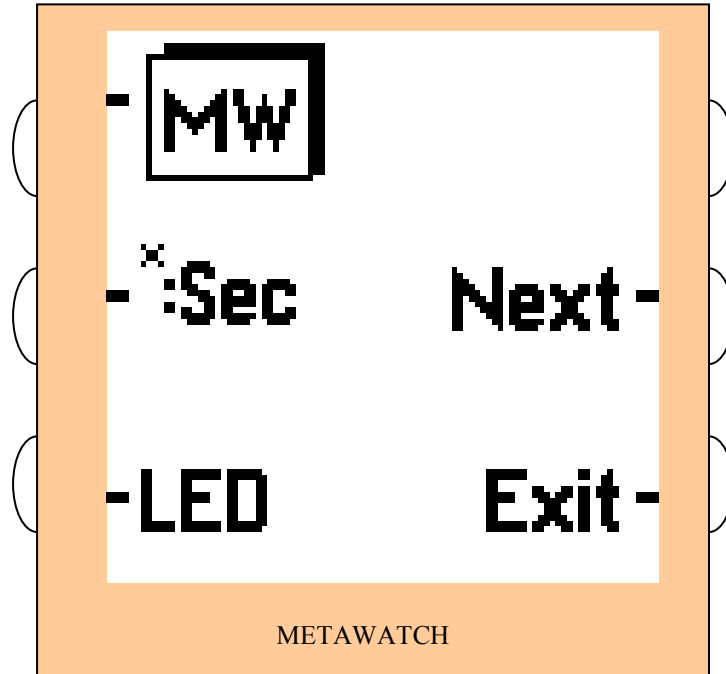
2.5.3 Menu Page 3 Description of Options

- **None** – Reserved for future use
- **Next Menu Page** – Goes to Page 3 of the Menu
- **Exit Menu** – Exits the Menu, saves all changes to Flash memory, returns the watch to the Idle screen.
- **Turn on LED** – Turn the LED ON for the default time.
- **Toggle Seconds count ON/OFF** – When ON, the day and date in the system time area of Idle Mode is replaced by a seconds count. Turning this option ON does consume more power then when it's OFF.
- **Invert Display** – This button toggles between white on mirror and mirror on white display. These options are inverses of each other.



Menu Mode Page 3 with all items ON

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Menu Mode Page 3 with all items OFF

2.6 PAIRING THE WATCH

Since the watch has a small user interface, the initial software is configured so that the pairing procedure should be started by the other device. Make sure the watch has Bluetooth ON and has Discoverable mode ON before pairing.

There are two methods to pair, the easiest may be to go straight to the Meta Watch Manager application, found on the Android Market.

2.6.1 Pairing using the MetaWatch Manager for Android

Open the MetaWatch application, go to “Menu->Settings->Select Watch”. A list of discoverable devices will be displayed. If you do not see the watch at first, double check your Android phone has Bluetooth set to ON and also that the watch has Bluetooth and Discoverable modes ON. If so and you still can not see the watch, you may need to move to a less radio noisy environment and try again.

Once you see the watch in the list of discoverable devices, simply tap on the watch (check the MAC address in the phone list matches what your watch is displaying). This saves the watch address. Next go “Back” and hit “Menu->Start”. The MetaWatch service will attempt to connect, if the watch had not been paired previously, then a pairing request will be displayed either as a pop-up menu or as an item in the notification bar.

The pairing code (for non-SSP mode) is four zeros. Enter “0000” with no quotes. The pairing should complete and the MetaWatch Manager will finish establishing the connection to the watch.

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2.6.2 Pairing using Android Wireless Settings

Go to the Bluetooth Settings area of your phone (Often found in: Settings->Wireless and Networks->Bluetooth Settings). Make sure that you Bluetooth radio is turned ON and that the watch has Bluetooth and Discoverable modes ON. Press “Scan for Devices” on your phone, if you can not see the watch, you may need to move to a less radio noisy environment and try again.

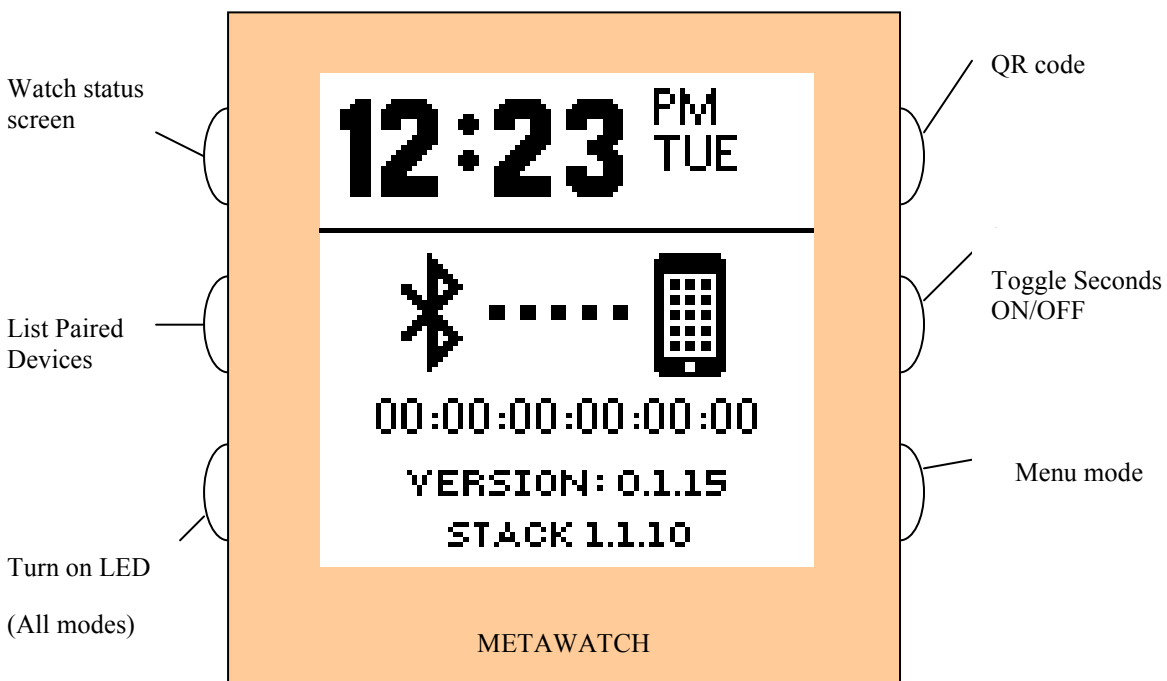
Once you see the watch in the list of discoverable devices, simply tap on the watch’s name, if the watch had not been paired previously, then a pairing request will be displayed either as a pop-up menu or as an item in the notification bar. The pairing code (for non-SSP mode) is four zeros. Enter “0000” with no quotes. The pairing should complete.

Once paired, open the Meta Watch Manager application. Now this application needs to know which watch you want to use, so go to “Menu->Settings->Select Watch”. A list of devices will be displayed, select your watch from that list.

***Bug Note: Currently, this “Select Watch” menu only displays discoverable devices. Meta Watch turns it’s discoverable mode OFF automatically once paired. This causes the watch to not show up in this menu when paired by this method. The work around is to manually turn the Discoverable Mode ON using the watch Menu and then “Select Watch. Or you can use the Meta Watch Manager for Android pairing instructions instead. Or you can enter the watch’s MAC (also called BDA which stands for Bluetooth Device Address) by using the “MAC” button instead.*

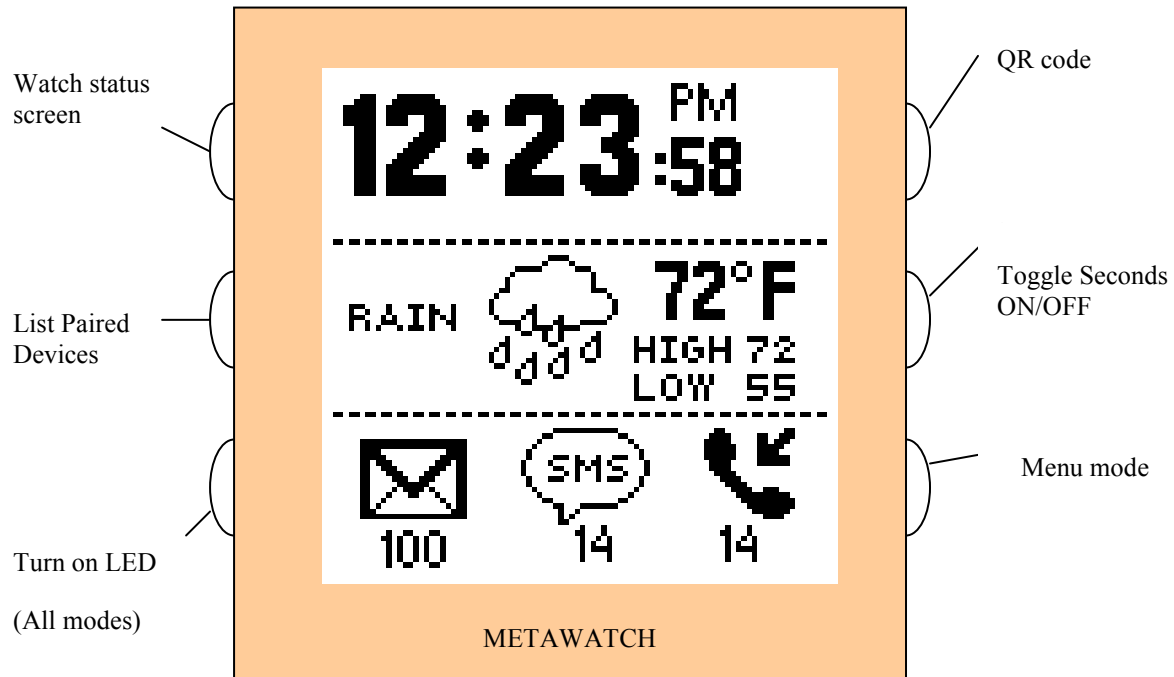
This saves the watch address. You can see the saved watch address by touching “MAC”, careful not to change this address on accident. Next go “Back” and hit “Menu->Start”. The MetaWatch service will attempt to connect and the MetaWatch Manager will finish establishing the connection to the watch.

2.7 WATCH UI WITH PAIRED DEVICE



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2.7.1 Seconds Count

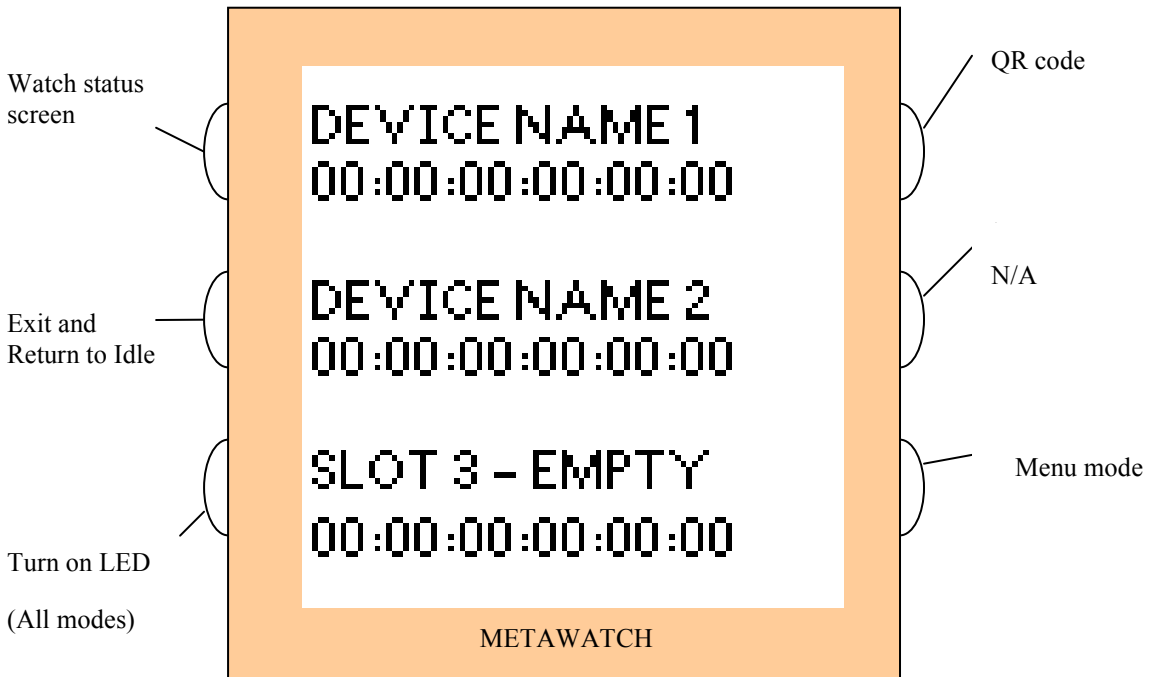


The seconds count can be turned on or off by a remote message or by a button press B or in the menu.

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2.7.2 List Paired Devices

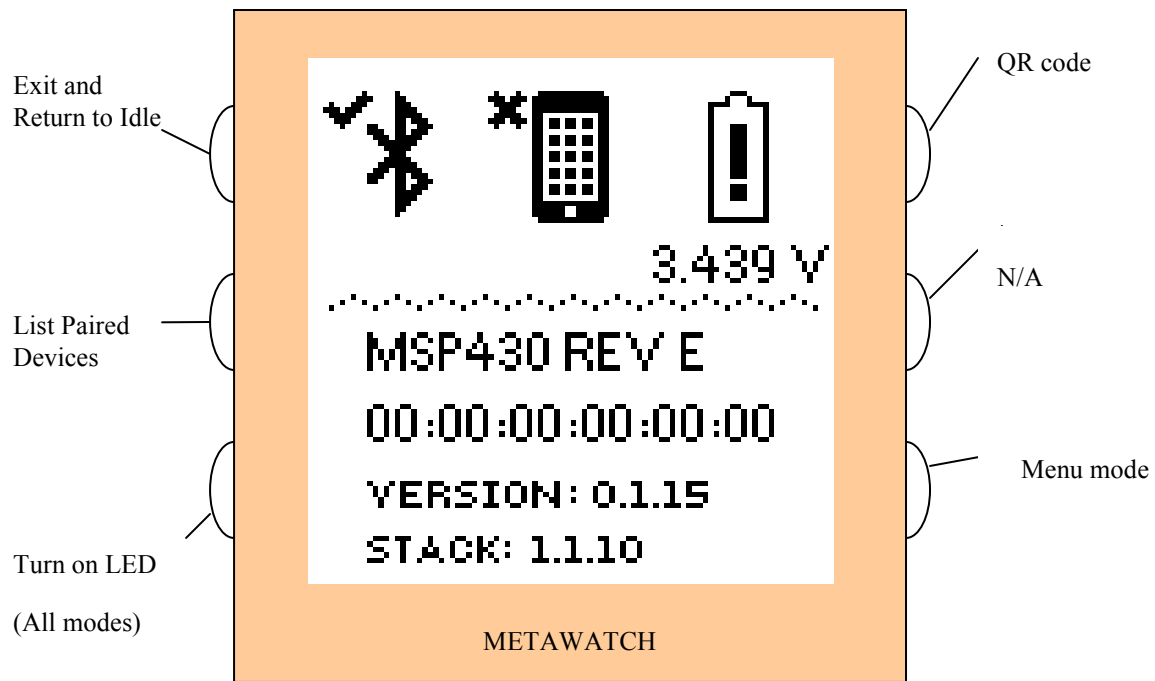
The watch supports up to 3 pairings in memory at a time. Pairing slots are filled by round-robin, when the last slot is filled, the first slot is then overwritten. If you attempt to pair a device that already has been paired, the name, link, and security information will be replaced but it will remain in its current slot. If a new pairing times out, or errors, or is stopped, the previous data in the slot will be preserved. It will only be overwritten if the new pairing is successful.



Shown here are 3 slots available for paired data. Two are used and one is empty.

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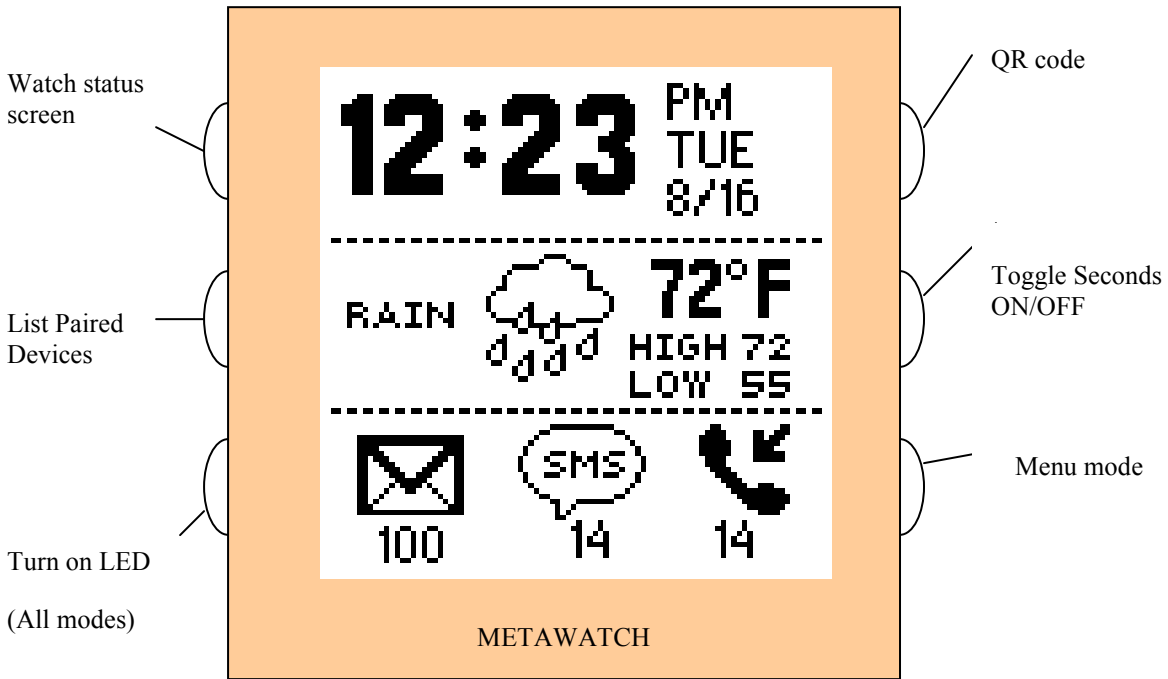
2.7.3 Watch Status Screen



Status screen shows battery status (low, charging status, voltage) as well as Bluetooth ON/OFF and Phone connected or not. MAC, MSP430 rev, software version, and stack version are still visible.

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2.7.4 Connected and Idle buffer data loaded from phone

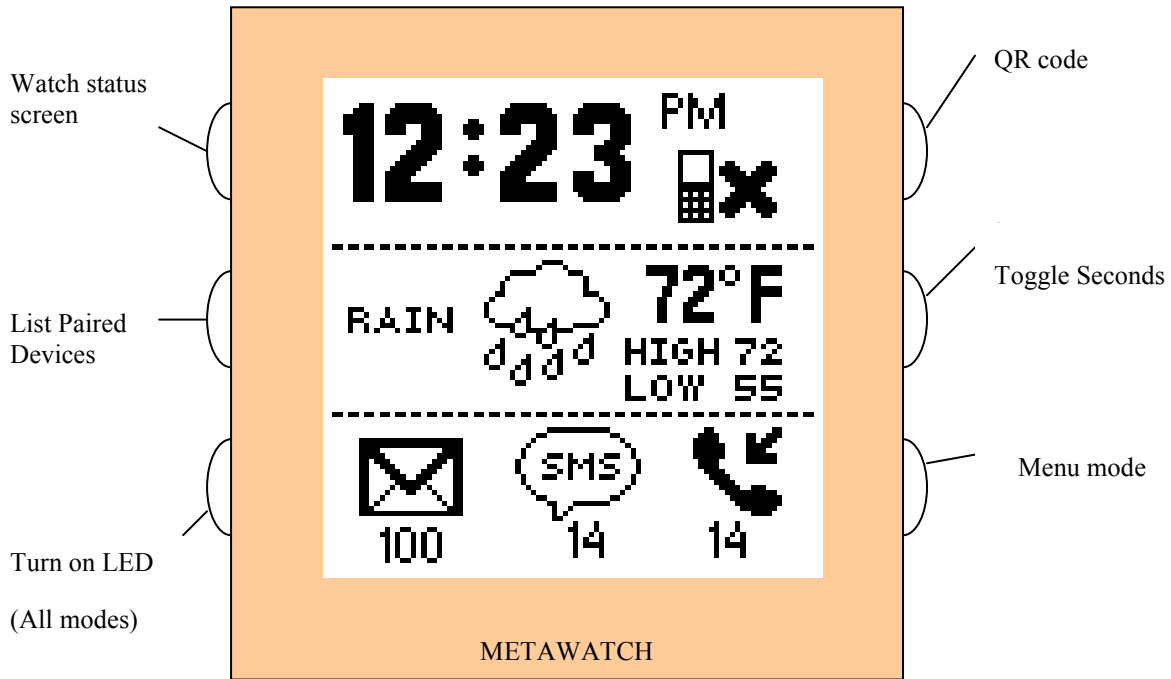


When operating normally, the day of the week and date are displayed. When there are warnings, they and date display are replaced by various informational icons.

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2.7.5 Link Alarm Warning

Warnings given on the system time area. The system status area serves as a glanceable reminder of the warning after the initial vibration.

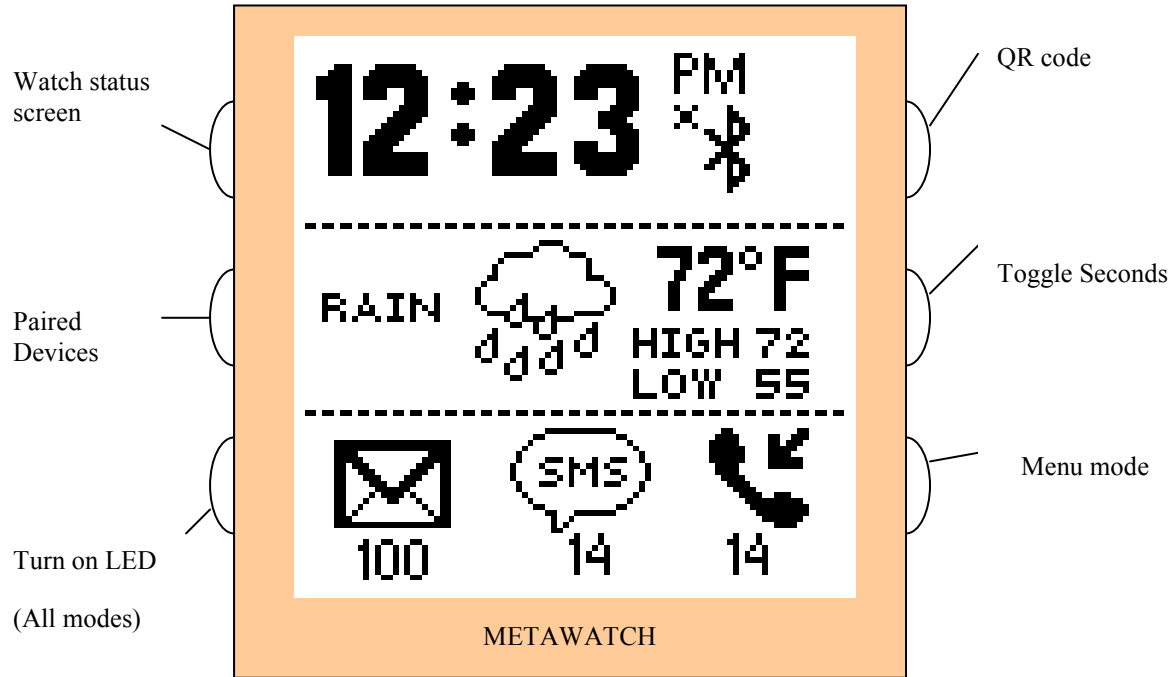


Example of a lost link warning in the system time area.

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2.7.6 Bluetooth OFF indication

When Bluetooth is OFF, either manually using the user menu or automatically due to a critically low battery, there is a graphical indication of the radio OFF state in the system time area of Idle Mode.



Bluetooth OFF in Idle system area.

2.7.7 Participate in the Community

You make us better. Help improve Meta Watch by reporting bugs, contributing your own code, requesting enhancements, or just participating in the discussion. Please visit the Forums section of www.MetaWatch.org and join the community!

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