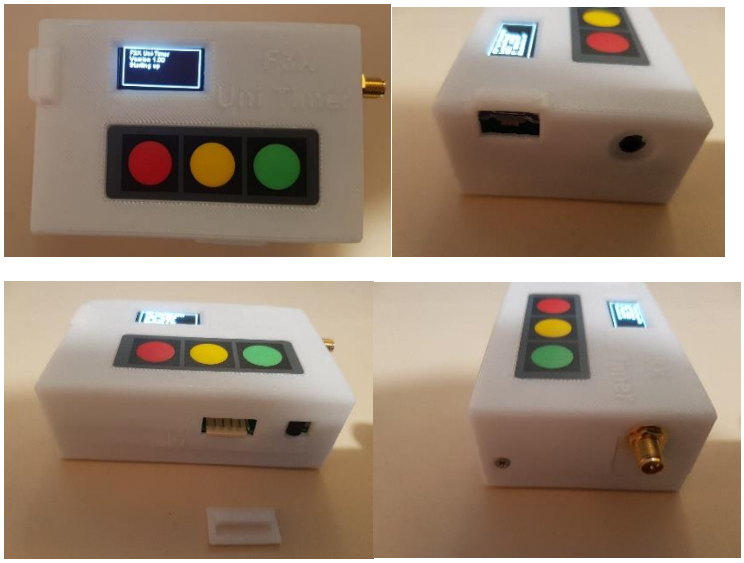
F3X Uni-Timer Version 1.0.6

Contents

1. Introduction

Version 1 of the Uni-Timer is an early development of the full potential of the unit. Some functionality has not yet been implemented. Web pages are very simplistic. Bluetooth is very experimental and subject to failure. However, the unit does operate as either a central timing unit or as a base unit.

2. Switches and ports



1. Display
2. Menu and operation switches
3. USB port – connect to phone charger to charge the battery
4. Audio out – connect headphones or a powered speaker
5. Expansion port
6. On/off switch
7. Antenna
8. Case screw
9. Charging LED

3. Battery

The system is designed to be powered by a single cell (1S, 3.7V) LiPo or LiIon battery. A flat 1,200 mAh or 2,000 mAh battery will fit. The unit has been fitted with a female JR style 3 pin connector.

Installation

The case must be opened to install the battery. Remove the case screw and antenna nut. The case can then be hinged open from the antenna end. The battery can then be mounted to the case back using double sided tape.

Charging

The unit has a USB charger built in. Connecting a USB power source and turning the unit on will initiate charging. Charge time is approximately 8 hours for a 1,200 mAh battery. Charging is indicated by a red LED visible through the case to the left of the display (not for dark blue cases). The LED has three modes when the USB is connected:

1. Flashing – USB power has been applied, but power switch is off – unit is not charging
2. Solid red – unit is charging
3. Off – battery is fully charged

Note that the unit can be used whilst charging. It will turn on as soon as USB power is connected.

Units made from July 2019 also have a charge socket next to the antenna connector. This is a three-pin header that a standard JR connector will plug into. The centre pin is positive and the two outer pins are negative. The header is directly connected to the battery so a standard LiPo charger can be used. The charging rate should be kept down to about 500 mA for these small batteries.

Battery voltage indicator

The battery voltage is visible on the main menu and the flight screens.

4. Starting

When powered on, either by battery or USB, the unit will go through start-up stages dependent on its settings:

1. Power on screen
    a. Startup
    b. Wifi initialisation (if wifi enabled)
    c. Bluetooth initialisation (if Bluetooth enabled)
2. Information screen – shows web server URL, wifi mode, Bluetooth status
3. Pressing the yellow button then shows the main menu

5. Navigation

There are three buttons used to navigate the system:

1. Red – flight reset
2. Yellow – menu item select
3. Green – menu item navigation and flight start

4. System Menus

Main Menu

The main menu has the following (in Base Unit configuration the Setup Bases item is not present):

1. F3F Flights – flight menus
2. Setup Bases – base and camera unit selection
3. Options – setup options
4. Sleep – puts the unit into low power sleep mode. Use when charging.
5. Network Info – displays network connection information

F3F Flights Menu

1. Practice Flights
2. Practice Laps
3. Contest Flights (not yet implemented)

Options Menu

1. Volume – Cycles through 10 steps by pressing Yellow button
2. Unit Type – CD, Base A, Base B, Audio, or Wind (changing requires a restart)
3. Wifi – Client, AP, or Off (selecting goes to the wifi menu)
4. SSID – ID of the wifi to connect to (selectable from a stored list of five)
5. Bluetooth – On or Off (selecting goes to the Bluetooth menu)

Bases Menu

Allows binding of base or camera units to use with the system.

Binding process

1. Ensure that the relevant base or camera unit is turned on
2. Select the unit in the Base menu. It will show 'On' and should also show 'Linked' to confirm that binding has been successful and then the signal strength (1-10).
3. This process only needs to be done once. The configuration is saved and subsequent use of the system uses the saved configuration.
4. Units should be deselected if they are not being used ('-' shown next to unit name)

Wifi Menu

The WiFi type can be selected to be one of:

- Client (UniTimer connects to an access point, e.g. a mobile phone hotspot)
- AP (UniTimer sets up its own access point)
- Off (Wifi is turned off)

A restart is necessary when switching Wifi modes

Bluetooth Menu

The affects only the Bluetooth button operation. It has no effect on Bluetooth audio, which is always enabled (if fitted).

Bluetooth can be set to:

- On, or
- Off

The button type must be set. It is selectable between:

- iTAG button
- TrackerPA button

A restart is necessary when switching Bluetooth modes

Signal indicator

A small Y or N will show in the bottom right of the display on the flights pages and setup menu. When using the unit as a base unit, this indicates connection to the central timing unit. Y=connected. N=not connected.

5. Wifi

Wifi Modes

The unit has three wifi modes:

1. Client Mode – connects to a wifi access point, e.g. a router or phone set to be a mobile hotspot
2. AP Mode – runs its own access point that other devices can connect to
3. Off – wifi disabled

When in Client or AP mode, devices such as smart phones can connect to the unit's web pages for information and configuration.

AP Mode

If AP mode is selected then the unit will start up its own access point called 'F3X Timer'. To use this:

1. Use a wifi device, e.g. mobile phone to connect to the unit
2. On the phone wifi setup select 'F3X Timer' from the available wifi sources
3. In a web browser, enter 192.168.1.4 as the address to use

AP mode must be used for setting up the client mode access point details.

Client Mode

If Client mode is selected, then the unit will attempt to connect to a local wifi access point using saved credentials. These credentials are stored in a file on the system called ssids.csv. The details (SSID name and password) of up to five access points can be stored in the system. The access point to use is selected in the Options menu.

If the access point is not turned on, not in range, or the credentials have not been set, then a warning will show saying that it is unable to connect. Press the green button to continue. Wifi will not be active.

Further details on setting up Wifi are available here:

https://github.com/simonwa2/F3X-Timing-System/wiki/F3X-Uni-Timer---wifi-modes

and:

https://github.com/simonwa2/F3X-Timing-System/wiki/F3X-Uni-Timer---configuring-for-multiple-wifi-access-points

7. Bluetooth

Bluetooth can be used to connect a remote button (iTag or TrackerPA). The button is used to start/reset a flight (unit as CD) or signal a turn call (unit as a base).

The button type should be selected from the Bluetooth menu.

The button device should be turned on prior to turning on the unit with Bluetooth enabled. The system will try to connect for about 15 seconds. If that fails it will ignore Bluetooth.

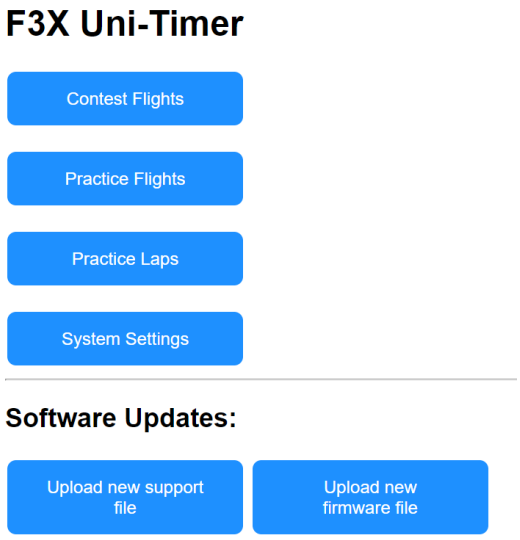
This function is experimental and subject to connection failure.

8. Web Pages

The unit has a web server that provides web pages for controlling and viewing flights, and for configuring the system. The address to use is shown on the startup screen.

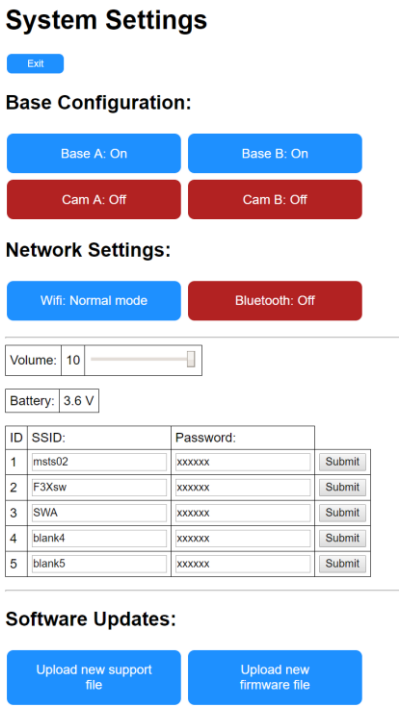
The web pages are in an early stage of development and are not fully functional, but the information shown on the pages is correct.

Main page



System Settings

Shows the current configuration for the bases and wifi. The wifi access points to use are set on this page



Practice Flight

Lap times and Total flight time are shown as the flight progresses

F3X Uni-Timer

Exit

Event:	
Pilot:	
Round:	
Flight:	# 1
Working Time:	30 remaining
Climb Out Time:	30 remaining
Flight Time:	0
Penalty Points:	
Flight Phase:	Ready

Lap 1	0.00
Lap 2	0.00
Lap 3	0.00
Lap 4	0.00
Lap 5	0.00
Lap 6	0.00
Lap 7	0.00
Lap 8	0.00
Lap 9	0.00
Lap 10	0.00

Volume:	10	

Battery:	3.6 V

9. Firmware Updates

Updating the firmware is done via a browser. There are two type of files that may need to be updated:

1. Firmware files. The actual code the unit runs. These all have a file extension of .bin, e.g. “F3X UniTimer vx.xx.bin”
2. Support files. The code for the web pages. These typically have a file extension of .mp3, .csv or .html.

Update files will be available from GitHub here:

https://github.com/simonwa2/F3X-Timing-System

Instructions for applying the updates are contained within each version’s page.

10. Base Unit Operation

If configured as a base unit, the menus are only slightly different, e.g. no Base Setup option. The unit will automatically go into the correct flight mode once the CD unit goes to an F3F flight start screen.

Signalling a turn can be done in three ways:

1. Pressing the Red button
2. Using a Bluetooth button
3. Connecting an external switch to the expansion port (D1)

11. Expansion Port

The expansion port provides for the following:

1. Two external switches – e.g. a base turn switch on D1
2. Anemometer (not yet implement in software)
    a. Davis 6410, or
    b. Peet Bros Ultimeter Pro
3. External alarm/buzzer (not yet implemented in software)

Connector pins (left to right):

1. Ground
2. 3.3V (for Davis anemometer only)
3. Relay – open collector output for driving a relay for an external buzzer
4. D2 – digital input for anemometer
5. D1 - digital input for anemometer or external switch
6. A1 – analog input for Davis wind direction

12. F3F flights

Practice Flights

Practice Flights provide full timing but are not saved to storage (currently). The sequence for a flight is the following stages:

1. Ready. Press Green button (or Bluetooth iTag) to start.
2. Pre-Launch. 30 second pre-launch countdown. Press Green button (or Bluetooth iTag) to launch.
3. Launched. 30 second climb-out countdown.
4. Out of Course. When signal received from base A, or Green button pressed
5. Started. When entered the course as signalled by Base A or Green button pressed
6. Lap counts
7. Finished

To reset a flight, press the Red button at any point of the flight, or the iTag once the flight is at Launched stage or later.

Manual or automatic start of the next flight can be set on the F3F Flights menu. The options are 10s, 15s, 20s, 30s or manual start. If an auto start time is selected then, at the end of a flight, a pre-launch countdown will commence. This gives the pilot time to fly back to the centre of the course n time to get the Launched signal and commence the 30s climb-out to start the flight,

To return to the Flights menu, press the Yellow button in the flight Ready stage.

Practice Laps

Practice laps provides for continuous laps, with the individual lap time called out. This allows testing of different turn techniques. Press Green button to start. Red button to Reset.

Contest Flights

Currently this is not implemented. It will provide for full contest timing.