FreeETarget

Service Manual

Version 5 (DRAFT 2)

July 2024

Table of Contents

Table of Contents

Introduction

INTRODUCTION

This document is the service manual for FreeETarget Version 5. It contains information about the operation of the target and PC client. For details about the construction of individual components, please see the component documentation.

The document is organized in chapters:

Commissioning	Putting your target in service for the first time
LED Indicators	What to the LEDs mean
Multifunction Switches	Configuring the switches for your needs
WiFi Operation	Setting up the WiFi for your environmane
Settings	How to configure the target to your applications
Uploading Firmware	How to put new software into the target
Trouble Shooting	Steps to take to resolve errors

OVERVIEW AND GLOSSARY

The FreeETarget system consists of three major components:

- PC Client,   The progam the user needs to see their score
- Target   The target assembly
- Circuit   The signal processor to read the sensors and compute the shot location
-

The PC client is responsible for displaying the target and shot information to the shooter. The major parts of the PC client are illustrated in Figure

The target shown in Figure connects to the PC Client using USB or WiFi as needed.

Introduction

Connect
Download
Debug
Align Target
Target
Settings
Running Time
Select Target
Version

Circuit
Witness Paper
Target Face
Sensors (behind target face)
Witness Paper Drive
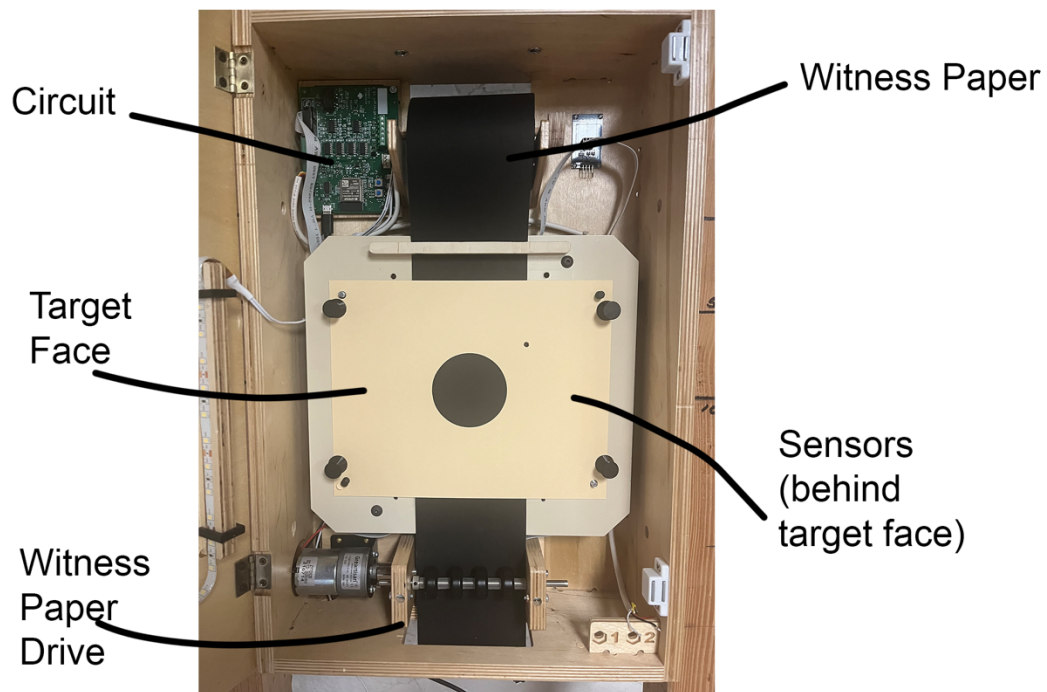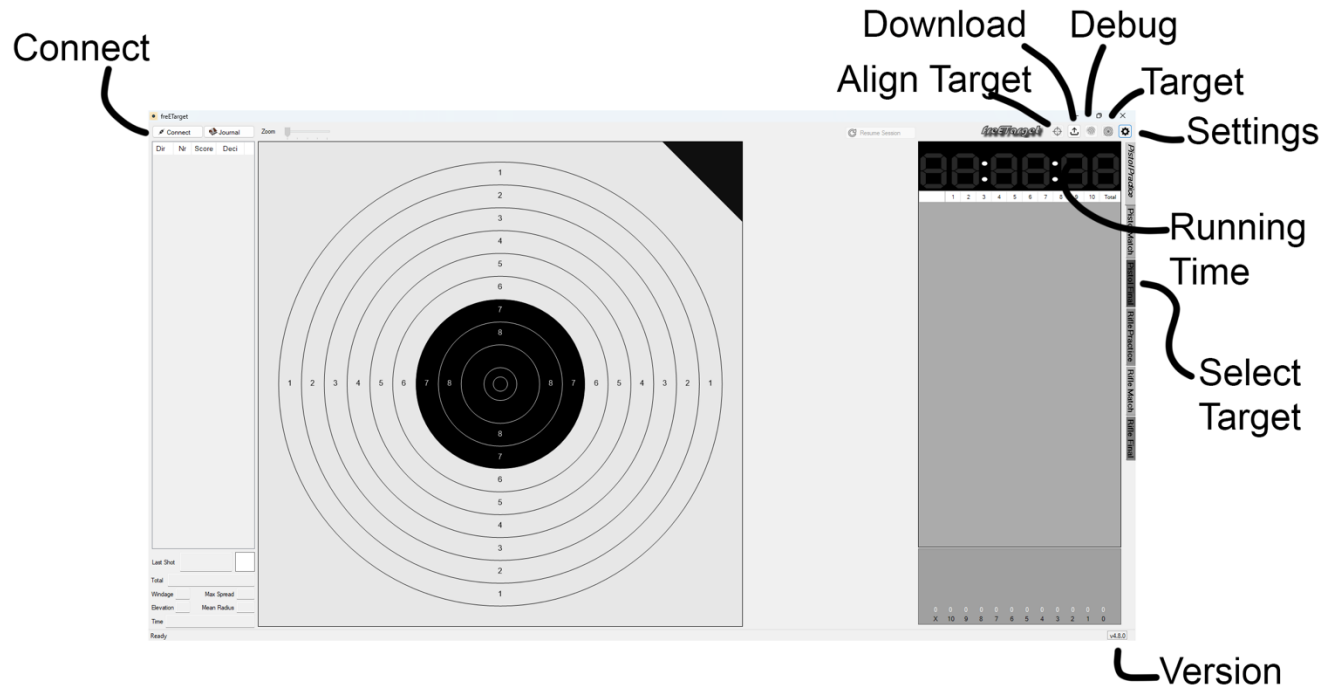
Introduction

The target is controlled by the circuit shown in Figure . The major components are shown in Figure
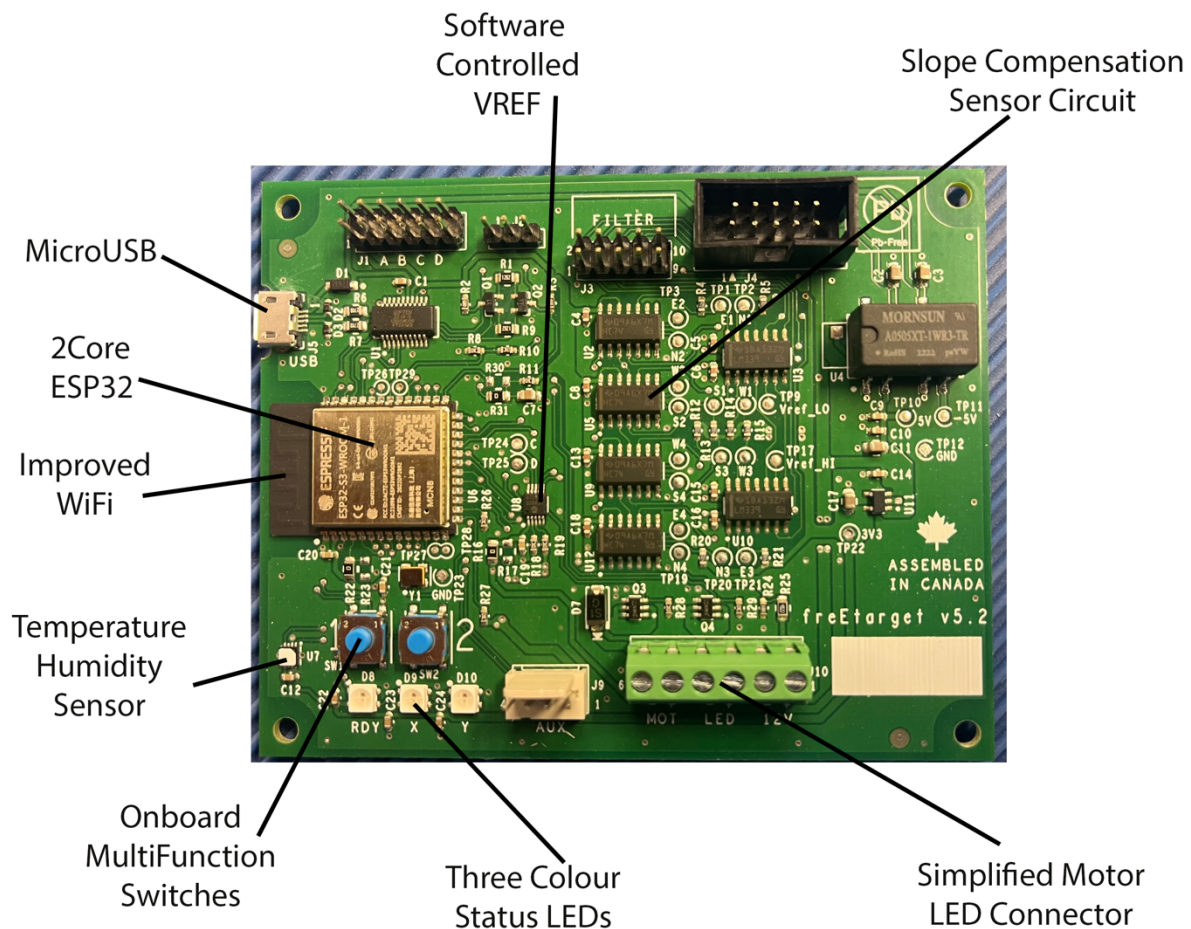
USB OR WIFI?

All Version 5 boards support WiFi and USB operation. For all practical purposes both USB and WiFi will provide the same target information. The differences are in the details of the connection media. The USB and WiFi are summarized

USB	
	Needs a purpose. Built 15 meter cable. DO NOT try to attach eight two-meter cables together
	Some PCs do not supply enough current to drive the cable and the board. You may need to add a power adapter near the target
	USB is needed to reflash the software

Introduction

	Power on diagnostics only operate on the USB connection
WiFI	
	Operates in both Access Point (easy) or Station Mode (allows internet access)
	Software flashing cannot be done over WIFi
	Supports up to four connections to each target

Commissioning

COMMISSIONING

Commissioning is performing the first steps to load all of your software and make the target ready for operation.

Commissioning involves the following steps:

Introduction	What makes up a target
Commissioning	Putting the target into service the first time
LED Indicators	What message to the LEDs display
Multifunction Switches	Setting the switches for individual prefereances
WiFI Operation	Setting up the WiFI
Setting up the PC client software	Performing the configurations needed to connect the target
Loading the tools needed to update the target firmware	Downloading files to allow for software updates

REQUIRED

- freETarget PC Client 4.5 or higher
- Firmware V5.0 or higher

INSPECTION

After you have assembled the freETarget into the target holder, inspect the following

- The flat cable is pressed firmly into the sensors and signal board
- There are no kinks or sharp bends in the flat cable.
- All of the sensors are correctly installed North through West
- When using the LED illumination
  - o Verify the 12V supply wires are attached to the board
  - o Verify that the LED wires are attached to the board
- When using the witness paper drive
  - o Verify that the 12V supply wires are attached to the board
  - o Verify that the motor wires are correctly attached to the board

With the USB cable plugged into the PC, turn on the PC
  - o Verify that the RDY LED is blinking green (or Blue)
  - o Verify that no other LEDs are blinking

Commissioning
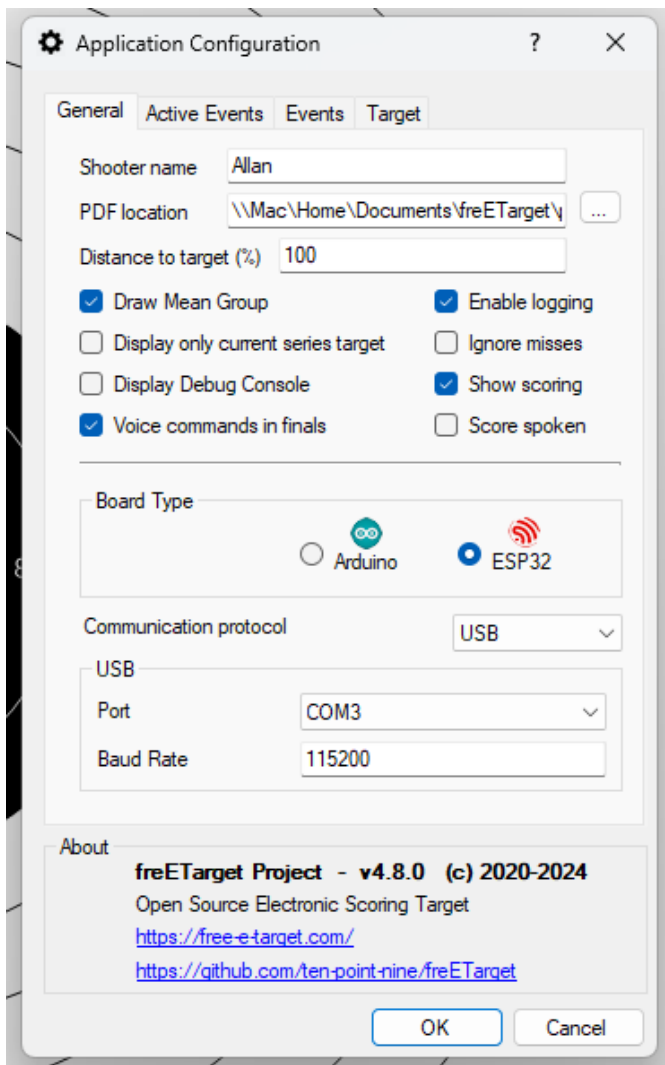
DOWNLOAD THE PC CLIENT SOFTWARE

Visit the free-e-target.com -> Technical Support > Downloads to obtain the latest PC Client Software

Open the downloaded file from the download folder and install the software

SETUP THE PC CLIENT

Launch the PC client and select Application Configuration from the upper right icons (Settings)

Commissioning

- Enter the information needed,
- Select ESP32 for Version 5 hardware
- Choose the USB port (for the initial setup)

FIRST SHOT

Set the target up ten meters from the firing point. Press the CONNECT button on the upper right of the PC client.

- Verify that after a few seconds the PC connects to the target
- The running timer increments or decrements.
- The target colour changes

If the target does not connect then review the connections and settings. Common mistakes include
- USB not configured correctly
  - o Check the settings
- USB cable not plugged in correctly
  - o Check the USB cables
- Defective USB cable
  - o Repeat the setup but use a shorter (less than 2 meters) USB cable

Once the target connects, fire five shots into the paper. Try to separate the shots into 10, 8, 6, 4, 2 rings.

- Did the shots register in the correct place?
  - o Yes, you're done
  - o No.
    - ▪ Did five shots register anywhere – Yes circuit works.
    - ▪ No shots registered – Recheck cables and connections
    - ▪ Press the DEBUG button (upper right)
      - Does it show an error?
    - Do all 10 shots show up on the display?
      - o No, check the cables and settings
    - Are the shots correct, but the mirror image?
      - o The sensors are installed correctly, but mirror image.
      - o Swap North and East
      - o Swap West and South
      - o Go back to the beginning and test the circuit.
    - Are the shots correct, but the reversed top and bottom?
      - o The sensors are installed correctly, but upside down.
      - o Swap North and West
      - o Swap South and East
      - o Go back to the beginning and test the circuit.

LED Indicators

LED INDICATORS

The LED indicators are used to shot the internal operation of the target, and fault diagnostics.

RDY	X	Y	
			Normal Operation
RED	WHITE	BLUE	Power on self test (Hello World) to show that the software has booted and the circuit has some functionality
GREEN			The software has started but not ready for a shot
BLINK GREEN			The software has completed startup and ready to receive shots
BLINK BLUE			The target is connected to a PC through WiFi
BLUE			The target has gone to sleep
	BLINK GREEN		The WiFi is in station mode but not connected to a PC
	GREEN		The WiFi is in station mode and connected to a PC
	BLUE		The WiFi I in access mode but not connected to a PC
	BLINK BLUE		The WiFI is in station mode and connected to a PC
		RED	Receiving data from the PC over WiFi or Serial
		GREEN	Transmitting data to the PC over WiFi or Serial
	GREEN		Shot press on MFS A (Switch 1)
	WHITE		Long press on MFS A (Switch 1)
		GREEN	Short press on MFS B (Switch 2)
		WHITE	Long press on MFS B Switch 2)
			Fault Codes
RED	RED	RED	Failure detected on NORTH sensor
RED	RED	GREEN	Failure detected on EASH sensor
RED	RED	BLUE	Failure detected on SOUTH sensor
RED	RED	YELLOW	Failure detected on WEST sensor
RED	GREEN	RED	Miss detected

MultiFunction Switches

MULTIFUNCTION SWITCHES

The Multi Function Switches are general purpose inputs and outputs that can be set to perform a user defined operation.

There are two sets of switches that are connected to the J1 connector at the top of the board. The connector is illustrated in Figure Y

J1
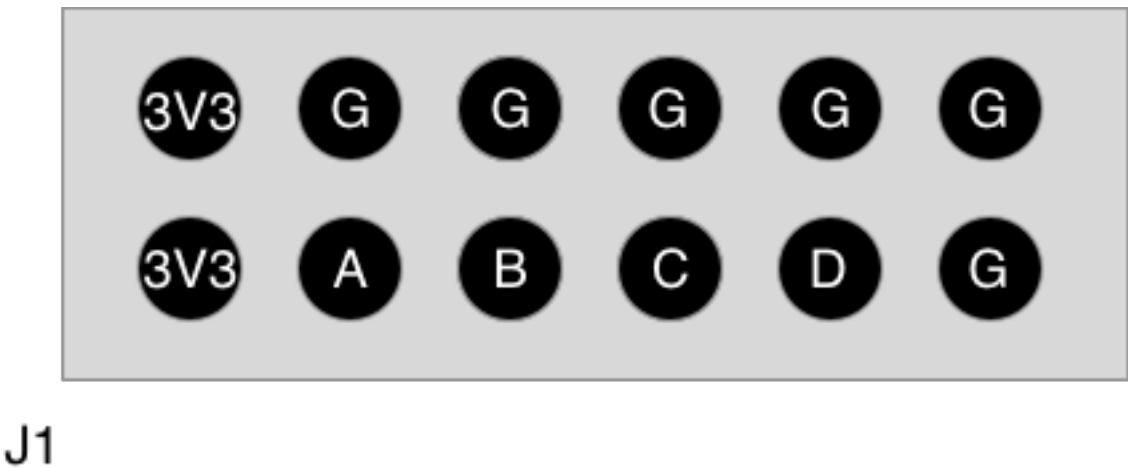
The 12 pins are assigned

1, 2	3.3 Volt , 50mA supply for interfaces
4, 6, 8,10, 11, 12	Digital Ground
3	Digital input A, also connected to push button 1
5	Digital input B, also connected to push button 2
7	Digital input or output C, defined in software
9	Digial input or output C, defined in software

DIGITAL INPUTS A/B (1/2)

Push button switches 1 and 2 are routed to discrete inputs A & B and have five modes of operation

- Tap switch 1
- Tap switch 2
- Hold switch 1
- Hold switch 2
- Hold switches 1 and 2 together

When pressed, the software starts a timer, if the switch is released inside of 2 seconds, it is considered a tap. If the switch is held for more than 2 seconds it is a hold. If both are held at the end of 2 seconds, then BOTH switches are held

DIGITAL INPUT OPERATION

Multifunction Switches

The switches are configured by using the JSON command to each of the switches and modes,

- {"MFS_HOLD_1":X}
- {"MFS_HOLD_2":X}
- {"MFS_HOLD_12":X}
- {"MFS_TAP_1":X}
- {"MFS_TAP_2":X}

Where the value of X is defined in Table A

Table A: Digital Input MFS Values

Value	Action	Description
0	Power Tap.	Wake the target up if it has gone to sleep
1	Paper Feed	Turn on the witness paper drive to feed paper
2	LED Adjust	Increase the brightness of the LEDs until 100% and then reset to zero
3	Paper Shot	Advance the paper a set distance as if a shot has been recognized
4	PC Test	Simulate a random shot sent to the PC client
5	On / Off	Put the target to sleep
6		
7		
8		

DIGITAL INPUTS OR OUTPUTS C/D

Connections C and D differ from A and B in that C and D can be configured as inputs or outputs as needed

INPUT OR OUTPUT OPERATION

The switches / outputs are configured by using the JSON commands

- {"MFS_HOLD_C":X}
- {"MFS"HOLD:D":X}
- {"MFS_SELECT_CD":X}

Where the value of X is defined in Table B

Table B: Digital I/O MFS Values

Value	Action	Description
9	No action	
10	Target Type	Used to inform the PC of a specific target type
18	Rapid RED	Output is used to drive the RED indicator when in rapid fire
20	Rapid GREEN	Output is ued to drive the GREEN indicator when in rapid fire

Multifunction Switches

22	Rapid LOW	{"MFS_SELECT_CD":22} indicates that the rapid indicator LED is active low (0 turn on LED
24	Rapid HIGH	{"MFS_SELECT_CD":24} indicates that the rapid indicator LED is active high (01turn on LED
26	Stepper Drive	The output is used to drive a stepper motor

WiFi Operation

The Version 5 hardware has two modes of WiFI operation

- Access Point. The target provides its' own SSID, typically FET-TARGET. Each target is a unique SSID
- Station. The target uses the local (home) SSID. Multiple targets can be on the same SSID

The default operation of the FreeETarget is to be an access point, This allows for simple setup, but means that the Client PC cannot be on the internet at the same time as the target is connected.

While harder to setup, Station mode allows multiple targets to be on the same network as the PC and an internet connection

ACCESS POINT

Access point is the default operation. Access point sets the SSID of the target to be FET-name, where name can be changed through a command line

The controls for the access point are:

Control	Description
{"NAME_ID":x}	The NAME_ID allow the operator to select an SSID from a list of available SSIDs
	0 – FET-TARGET. (Default)
	1 – FET-1
	2 – FET-2
	3 – FET-3
	4 – FET-4
	5 – FET-5
	6 – FET-6
	7 – FET-7
	8 – FET-8
	9 – FET-9
	10 – FET-10
	11 – DOC
	12 – DOPEY
	13 – HAPPEY
	14 – GRUPMY
	15- BASHFUL
	16 – SNEEZY
	17 - SLEEPY
	18 – RUDOLF
	19 – DONNER

WiFi Operation

	20 – BLITZEN 21 – DASHER 22 – PRANCER 23 – VIXEN 24 – COMET 25 – CUPID 26 - DUNDER 27 – ODIN 28 – WODEN 29 – THOR 30 - BALDAR
{"WIFI_CHANNEL":X}	Sets the WiFi channel Use this control if there is a conflict with another network near the target Range 1-11, Default 6. U
{"WIFI_HIDDEN":X}	Hides the SSID from the network 0 – Visible 1 - Hidden
{"WIFI_PWD":"xxxx}	Assigns a password to the target SSID

IMPORTANT

When used in Access Mode, the target set itself to a fixed IP address of 192.168.10.9 and port 1090

The SSID used by the PC must match the one assigned by NAME_ID, and is typically FET-TARGET

STATION MODE

Station mode allows the target to be on the same network as other devices in the building. For example the target can be on the home network allowing the target and teamViewer to be active at the same time on the same network

The controls for the Station Mode are:

Control	Description
{"WIFI_PWD":"xxxx"}	Assigns a password to the active SSID
{"WIFI_SSID":"xxxx"}	Selectes the SSID to be used by the target

IMPORTANT

When used in Station Mode, the router assigns the IP address to the target. To find the IP address that has been assigned to the target, use the {"ECHO":0} command to list the settings and look for

WIFI_IP_ADDRESS: A.B.C.D, where A.B.C.D is the address that needs to be entered into PC client configuration

WiFi Operation

When using Station Mode, the PC Client will issue a warning that the SSID is not of the form FET-name. This is for information only and can be ignored.

QUICK SETUP

Starting in Version 5.2, the software supports a quick WiFI setup

From the debug tab, send the command {"WC"} to the target

The target will respond with

!- Exit
1 – SSID
2 – Password
3 – Channel
4 – Hide Access point SSID

Enter the item ID and press [SEND]

Then enter the information when prompted and press [SEND]

Settings

SETTINGS

The software has a number of settings that affect the operation of the unit

Setting	Description	Typical Settings	Saved
ANGLE	Orientation of the sensors from vertical	45 degrees	Y
FACE_STRIKE	Enables face strike detection	Must be zero	Y
FOLLOW_THROUGH	Time to wait before transmitting score	0 – Immediate, 5 - Training	Y
KEEP_ALIVE	WiFI beacon used to keep the WiFi connection alive	120	Y
LED_BRIGHT	LED brightness 0-100%	0 – Off, 100 - fully on	Y
MFS_HOLD_12	Action to perform if both MFS switches are held down	2 – LED adjust	Y
MFS_TAP_2	Action to perform if switch 2 is tapped	0 – Wake up	Y
MFS_TAP_1	Action to perform if switch 1 is tapped	3 – Paper shot	Y
MFS_HOLD_2	Action to perform when switch 2 is held for 2 seconds	5 – Turn the target off	Y
MFS_HOLD_1	Action to perform when switch 1 is held for 1 second	1 – Paper feed	Y
MFS_HOLD_C	Action to perform with GPIO C	9 – No action	Y
MFS_HOLD_D	Action to perform with GPIO D	9 – No acton	Y
MIN_RING_TIME	Time before next shot is recognized after the current shott	500 ms	Y
NAME_ID	Index to select a target name for FET-	0-31, default 0	Y
PAPER_ECO	Distance in mm to ignore shot and not move paper	0 – Disabled, 1-100 mm	Y
PAPER_TIME	Sets the time the motor turns to advance the witness paper	500ms	Y
PCNT_LATENCY":	Uses a calibrated offset to improve the detection accuracy	0 – Disabled, 32 Typical	Y
POWER_SAVE	Idle time in minutes before going to sleep	0 – Off, Typical 30 minutes	Y
RAPID_COUNT	How many shots in a rapid fire string		N
RAPID_ENABLE	Enable rapid fire mode	1 - Enable	N
RAPID_TIME	How long will the rapid fire event last in seconds		N
RAPID_WAIT	How long to delay after rapid fire has been enabled		N
SEND_MISS	Send a record to the PC whenever a shot has been missed		Y
SENSOR	Calibrated distance between sensor faces	232mm for air pistol or air rifle	Y
SN	Serial number	Cannot be changed	
STEP_COUNT	How many steps to issue stepper motor witness paper	0 – Disabled	Y
STEP_TIME	Time interval in ms between steps	0 – Disabled	Y
TABATA_ENABLE	Enable the Tabata training mode	0 – Disabled	N
TABATA_ON	Time in seconds that the LEDs are on during a Tabata cycle		N
TABATA_REST	Time in seconds that the LEDs are off between shots		N
TABATA_WARN_OFF	Time in seconds that the LEDs are off after the warning		N
TABATA_WARN_ON	Time in seconds that the LEDs are on to warn the shooter		N
TARGET_TYPE	Target Override for alternate targets	0 – No override 4 – 5 bull target 74mm 5 – 5 bull target 79mm 11 – 10bull + sighters (Orion) 12 – 10 bull + sighters (NRA)	Y
TOKEN	Enable Rapid Fire token ring	0 – Disable, 1 Enable	Y
VREF_LO	Shot detection low voltage threshold	1.25 Volts	Y

Settings

VREF_HI	Shot detection high voltage threshold (VREF_HI > VREF_LO)	2.0 Volts	Y
WIFI_CHANNEL	WiFi channel used with Access Point targets	1 – First 6 – Recommended 11 - Last	Y
WIFI_HIDDEN	Hide the SSID of an access point target (FET-xxx_	0 Visible SSID 1 – Hode SSID	Y
WIFI_PWD	WiFi password associated with SSID. Both Access point and Station Modes	Default is empty, no password	Y
WIFI_SSID	SSID associated with Station Mode targets	Default is empty, Access Mode Non empty, Station Mode	Y
Z_OFFSET	Vertical distance from target plane to sensor plane	13mm typical	Y
NORTH_X/NORTH_Y	Correction in mm from ideal location	0 recommended	Y
EAST_X/EAST_Y	Correction in mm from ideal location	0 recommended	Y
SOUTH_X/SOUTH_Y	Correction in mm from ideal location	0 recommended	Y
WEST_X/WEST_Y	Correction in mm from ideal location	0 recommended	Y
	STATUS INFO		
TRACE	Display diagnostics trace.	1 Application 2 – Diagnostics (Hardware) 4 – Info 128 Critical (Always enabled	N
RUN_STATE	Internal running state	1 – Startup 2 – In operation (normal) 4 – Test Mode 8 - Sleep	N
RUNNING_MINUTES	How long the target has been turned on		N
TIME_TO_SLEEP	How long before the target goes to sleep		N
TEMPERATURE	Temperature in C inside the target. Used to calculate speed of sound		N
RELATIVE_HUMIDITY	Humidity inside the target. Used to calculate speed of sound		N
TIMER_COUNT	Expected maximum time expected to occur after shot	1 LSB – 100ns	N
V12	LED / Witness paper drive voltage	Nominally 12V	N
WIFI_MAC	MAC address of the WiFI		N
WIFI_IP_ADDRESS	IP address used by target		N
WIFI_MODE	Access Point or Station mode programmed into target		N
TOKEN_RING	Assigned token ring address		N
TOKEN_OWNER	Which target is the master of the token ring	Should be 1	N
VERSION	Current firmware version		N
PS_VERSION	Persistent storage version. Used for automatic updates		Y
BD_REV	Board revision		

Uploading Firmware

UPLOADING FIRMWARE

The target has the ability to be reprogrammed when new features are added or bugs fixed.

Uploading to the target performed in two steps

- Preparation – Setting up the PC Client download software, done once
- Upload – Uploading new software to the target

PREPARATION

Version 5 hardware uses an ESP32 microcontroller. The download software is provided by a Python module that must be installed before the firmware can be loaded. Once the Python module have been downloaded once, there is no need to do it again

DOWNLOAD PYTHON

From your web browser, search fo PYTHON DOWNLOAD

Follow the link and select Download

Python (Note the version number may be higher than shown here)

Download and install Python.

If prompted, select OVERRID MAX PATH LENGTH

Restart your computer to update the PATH variable

INSTALL ESPTOOLS

Once the PC has finished restarting, launch a command prompt and run the command

pip install esptool

The PC will return something that looks like

Uploading Firmware

```
C:\Users\allan>pip install esptool
Requirement already satisfied: esptool in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (4.7.0)
Requirement already satisfied: bitstring>=3.1.6 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (4.1.4)
Requirement already satisfied: cryptography>=2.1.4 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (42.0.2)
Requirement already satisfied: ecdsa>=0.16.0 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (0.18.0)
Requirement already satisfied: pyserial>=3.0 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (3.5)
Requirement already satisfied: reedsolo<1.8,>=1.5.3 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (1.7.0)
Requirement already satisfied: PyYAML>=5.1 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (6.0.1)
Requirement already satisfied: intelhex in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from esptool) (2.3.0)
Requirement already satisfied: bitarray<3.0.0,>=2.8.0 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from bitstring>=3.1.6->esptool) (2.9.2)
Requirement already satisfied: cffi>=1.12 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from cryptography>=2.1.4->esptool) (1.16.0)
Requirement already satisfied: six>=1.9.0 in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from ecdsa>=0.16.0->esptool) (1.16.0)
Requirement already satisfied: pycparser in
c:\users\allan\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-
packages\python311\site-packages (from cffi>=1.12->cryptography>=2.1.4->esptool) (2.21)

[notice] A new release of pip is available: 24.0 -> 24.1.2
[notice] To update, run:
C:\Users\allan\AppData\Local\Microsoft\WindowsApps\PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\python.exe -m pip
install --upgrade pip
```

Type

PATH

Verify that a line resembling

C:\Users\user_name\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-
packages\Python311\Scripts;

Should appear in your path variable

Uploading Firmware

Once the basic download package has been installed, you can download new firmware whenever necessary

Visit the free-e-target.com -> tech support -> download for the current release software. Download and save the file (typically to your download folder)

In the PC client, from the upper right corner, select the download icon. The download menu will appear
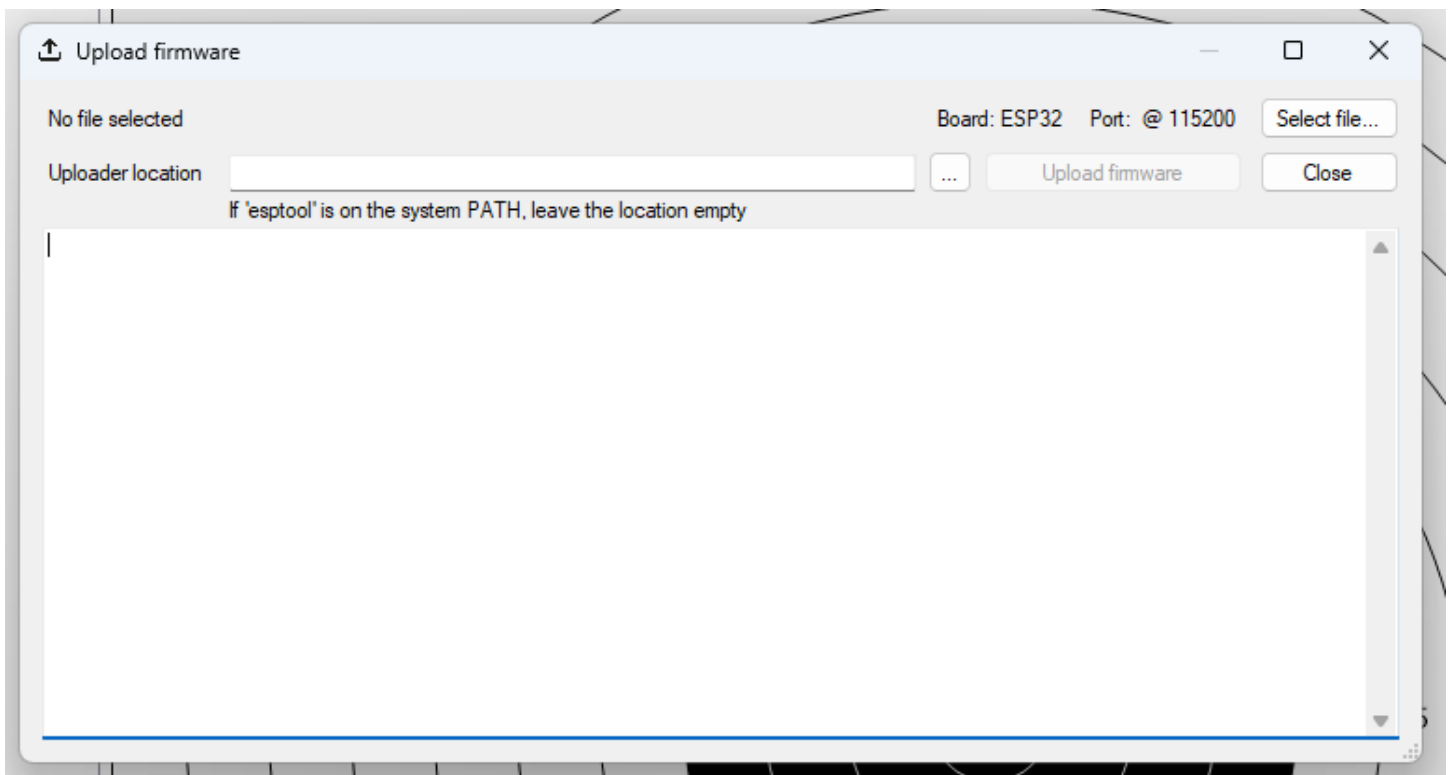
Select the download file, typically freetarget_version.bin

Press the upload firmware button. If everything is properly installed the PC will connect to the target and begin the upload.

Trouble Shooting

TROUBLE SHOOTING

The FreeETarget is a complicated system that relies on a number of components to work together. When they work it's great, but I something is out of place it may be difficult to determine the fault and take corrective action. This section goes over the common faults and fixes for the target.

Rougly speaking, there are two phases to the failures:

- Construction failures due to assembling the target incorrectly
- Operational failures due to debris or parts coming loose.

The troubleshooting section treats this as separate sections

CONSTRUCTION TROUBLE SHOOTING

You've put the target together and it doesn't record shots, what to do.

Step	Expected Result	Yes	No
1	When power is first applied do the LEDs show RED-WHITE-BLUE	The circuit has powered up and begun operation	Check the USB cable for power
2	After RED-WHITE-BLUE does the RDY LED start blinking	The self test has completed and begun normal operation	The LEDs will stop with a pattern, Refer to the section LED Indicators to determine the fault. Verify that all of the connections are in place
3	From the PC client, CONNECT to the target. After a few seconds doe the PC report connected, and the timer start counting	The USB is operational	Open the DEBUG tab. Is there an error or some message on the window? Folllow the corrective action recommended by the debugger
4	Take a shot into the target Is a shot registered more-or-less correctly	The circuit has detected the pellet and reported the location. Errors in assembly may introduce an error that can be calibrated out	Open the DEBUG tab. Is there a shot registered on the display? Is there an error message? Common Problems Cable not installed correctly Sensors in the wrong location
5	The shot looks good, but is the mirror image of what it should be	Reverse the NORTH-EAST and WEST-SOUTH sensors	
6	Is the LED illumination working?	The LEDs have been correctly installed	Verify that the LED wiring is installed correctly Verify that the 12V supply is attached to the screw terminals Verify that the polarity of the wires is correct

Trouble Shooting

7	When the shot was fired did the witness paper move	The witness paper is correctly installed	Verify that the 12V supply is attached to the screw terminals Verify that the polarity of the wires is correct

WIFI TESTING

Once the basic functionality has been verified the WiFi can be turned on and verified

Preparation

Step	Expected Result	Yes	No
1	From the DEBUG menu While connected to the USB, begin the WiFI configuration by typing {"WC"} [SEND] Does the WiFI configuration menu appear on the display?	The WiFI is ready for configuration	Verify the USB connection Retry the command Is there ANY information on the PC client?
2	If using Station mode Set the SSID		
3	If using a password, set the password		
4	If using an Access Point, set the Channel to 6		
5	Exit the configuration		
6	On the PC Client, DISCONNECT and CONNECT		
7	Using the DEBUG menu, look down the list of settings. Find the WIFI_IP setting		
8	If Access Point was used Is the IP address 192.168.10.9:1010	The WiFi is configured correctly	Check that the value WIFI_SSID is empty ("")
9	If Station Mode was used Is the IP address of the form 123.456.789.101:1090	The WiFi is configured correctly Record this IP address	Reenter the WIFI_SSID and the WIFI_PWD and try again
10	Verify that the PC is on the correct SSID for the target	The PC is configured correctly	Change the PC SSID to match the target
11	From the SETTINGs tab, set the connection type to TCPIP and enter the IP address recorded in Steps 8 or 9 as appropriate		
12	Press CONNECT	The PC is connected to the client	Repeat Steps 1 to 11

Trouble Shooting

	After a few seconds does the client show CONNECTED		

OPERATIONAL TROUBLE SHOOTING

Once you have successfully shot the first ten rounds into the target, you've proven that the target has been constructed correctly and all of the settings are correct. The target should continue to operate indefinitely.

Should the target stop working, it is most likely due to something being changed or an accumulation of dirt in the sensors. Follow the Table below for troubleshooting

MISPLACED OR NO SHOTS

When shooting a target, the shot is not recorded, or recorded in the wrong place

Step	Expected Result	Yes	No
1	The RDY LED is blinking green or blue	The target is receiving power and is operating correctly	The target is not receiving power or a short in the circuit Look for debris on the board Look for debris on the sensors, particularly West and South
2	Take a shot, Is a shot recorded in the right place	The sensors and calculations are correct	Make sure the flat cable is connected from the circuit board to all of the sensors. Press the cable in place Make sure that there is no debris on the West or South connectors Make sure that there is nothing blocking the sensors When using a SUIS target mask, or a regular mask with a hole in it, ensure that the witness paper is supported. Layer the target as Target Plate Scrap target Witness Paper Front Facing Target

WITNESS PAPER DOES NOT MOVE

The witness paper should move as each shot is registered. If it does not, use the table below to identify the error

Trouble Shooting

Step	Expected Result	Yes	No
1	Paper moves after every shot	The witness paper is operating correctly	Verify that the cables are connected and secure in the connector
2	The setting PAPER_TIME or STEP_COUNT are non zero	The setting appears to be correct	Program the correct value for your target
3	Press the paper advance button on the circuit Paper advances	The witness paper hardware is installed correctly	Verify the cables Verify the connectors Verify that the AC adapter is plugged in