

Manual Addenda

Remote Control

Before using the remote control, you must disable AutoClock™. To disable AutoClock™, hold down the AutoClock™ button for two seconds and release. The clock will display “no AC” to indicate AutoClock™ has been disabled. To re-enable AutoClock™, simply repeat the procedure. Once AutoClock™ is disabled, you may use the remote to control the clock. Press “preset” to cycle through the available presets (1:00, 3:00, 0:30, 1:00, 10:00). The last two presets (1:00 and 10:00) are automatic clocks; once they are loaded, they will relentlessly count down, and you cannot stop them with the remote. For all other clocks, simply press the “start/stop” button to start the clock (if it’s stopped) or stop it (if it’s started). Please note that when a touch is scored, the clock will stop automatically. The remote control uses an invisible infrared beam, which requires line-of-sight to operate. That is, if something is between you and Firefly (like a fencer!), the remote will not operate. Additionally, it can take some practice to aim the remote accurately enough. If you are having extreme difficulty aiming the remote, you can try increasing the sensitivity of the remote: see “Saved Settings” below.

Weapon Modes

In addition to being a regular FIE-compliant scoring apparatus, Firefly also has some different weapon modes that are just for fun, or for training purposes. To switch weapon mode, simply hold down the *Weapon* button for half a second; you will hear a beep and you will see “P 1” on the display; that indicates that you’re in weapon mode 1. Press it again, and you will see “P 2” and so forth, until you get back to “P 0”, which is the standard fencing mode. Please note that Firefly always starts up in normal fencing mode, and when you switch weapons, you are in normal fencing mode – you have to cycle through the weapon modes by holding down the *Weapon* button.

Weapon Mode 0 – Normal Fencing

Weapon mode 0 is the default mode, and Firefly will behave like any other scoring apparatus in this mode. Firefly always starts up in this mode, and when you switch weapons, Firefly will be in this mode.

Weapon Mode 1 – Monster Fencing (Foil, Épée)

Monster fencing is a fun and exhausting workout – instead of stopping after each touch, you keep going to fifteen touches! The display, instead of recording time, records score (the left two digits record the left fencer’s score, and the right two digits record the right fencer’s score). Every time you hit your opponent, the score is incremented, and then you are *blocked-out from making a touch for 1.5 seconds*. This block-out period allows your opponent time to respond, and prevents you from making frantic ripostes to drive up your score. When someone scores 15 touches, the buzzer goes off, and Firefly blocks, displaying the score for a couple of seconds so you can see who won. Please note that in foil, off-target touches do not register at all. The one thing to keep in mind in Monster Fencing is that the action doesn’t stop. This makes for a real workout, but remember, if you pass your opponent (due to a fleche or infighting), you’ll both have to be sporting and get back in front of each other before continuing. Monster Fencing is not currently implemented for saber.

Weapon Mode 2 – Time-to-Hit (Foil Only)

Time-to-hit is a training mode that tests your attack reflexes. When Firefly is in time-to-hit mode, depress the tip (in saber, touch your weapon to your lame) and Firefly will beep which is your cue to get ready...when it beeps again, hit a fixed target as fast as you can (in saber, you will have to set up a lame or other conductive target connected to the opposite side's A line – or you can just use a real opponent). There's a random delay between the two beeps, so don't try to cheat by anticipating the beep! Once you've hit, Firefly will display the number of milliseconds (thousandths of a second) it took you to hit the target after you heard the second beep. Rinse and repeat until you get that score down! Obviously, time-to-hit will be dependent on how far away you are from your target. If you do this drill often, you may want to make a mark on the floor that will be your starting line – that way you will know that your scores are improving because you are getting faster, and not because you're standing closer to the target! Time-to-hit mode is currently only implemented for foil.

Saved Settings

There are several Firefly settings that can be saved permanently (so that they don't change even when Firefly is turned off). Each setting has a number and a value, which are documented below. To access the settings menu:

1. Turn Firefly off
2. While holding down the AutoClock™ button, turn Firefly back on

Once you're in the settings mode, you can go through the settings and make changes. Please note that you must save the settings before they go into effect! To change & save settings:

- The setting number is displayed on the left two digits. Use the AutoClock™ (up) and Mem (down) buttons to go through the settings. After the last setting, you will see “5RUE”; more on this later.
- The current value of the setting is displayed on the right two digits. Use the Weapon (increment) and Flip Coin (decrement) buttons to change the value of the setting.
- Once you are satisfied with your settings, press Mem (down) repeatedly until you see “5RUE” on the digits. Press “Flip Coin”, and the settings will be saved and you may start using Firefly with the new settings.

The currently available settings are listed on the next page:

Setting Number	Supported Models	Description
00	All	Blink valid lights. If 1, valid lights will blink rapidly when a valid touch is scored. If 0, valid lights will light solidly when a valid touch is scored.
01	All	Blink off-target lights. If 1, off-target lights will blink rapidly when an invalid touch is scored. If 0, off-target lights will light solidly when an invalid touch is scored.
02	All	IR remote sensitivity. This sets the sensitivity of the remote sensor, where 1 is a very high sensitivity, and 5 is a very low sensitivity. You should leave this on a high sensitivity (1 or 2) unless you're getting a lot of interference from florescent lights, other remotes, etc.
03	FSR1d	"Forgiveness" mode. In this mode, the normal resistance threshold to score a touch is increased from 200 Ohms (per FIE/USFA rules) to 450 Ohms. If you have old or poorly-maintained equipment, this mode may help. 1 turns forgiveness mode on, 0 leaves it off.
04	All	Note for touch buzzer. You can specify any note on the chromatic scale from C4 (middle C on the piano) up to C8 (the highest note on an 88-key piano). C4 is 0, C#0 is 1, and so on, all the way up through C8 (48). See "choosing a buzzer sound" below for more information.
05	All	Default buzzer note. This is the note used for all other sounds (AutoClock™ starting, beeps, etc.). The values are the same as for the touch buzzer. See "choosing a buzzer sound" below for more information.
06	All	Repeater mode. Set to 1 to have this Firefly act as a repeater (extension light), or 0 for normal operation. To use as a repeater, connect to another Firefly with a crossover (null modem) serial cable. Only serial lines 2, 3, and 5 are used. See "extension light protocol" below for more information.
07	All	<i>Not used.</i>
08	All	Pre-2005 foil dwell timing. If you want to flick like it's 1995, this is the setting for you! Set to 1 to use pre-2005 foil dwell timing (note that this does not affect the lock-out timing for simultaneous touches), and 0 (the default) to use 2005 foil timing.
09	All	Remote key selection. Use 0 for remote A and 1 for remote B.

Choosing a Buzzer Sound

You can now select any musical tone for the Firefly buzzer, from C4 (middle C on a piano) to C8 (the highest note on an 88-key piano). You can change the touch buzzer tone, and the default buzzer tone separately. It's recommended that you make them the same note, or a fifth (7 semitones) apart, else it may sound unpleasant! While you may choose any note in this range, the piezoelectric buzzer used in Firefly is most efficient around 2kHz, so notes between G6 and E7 will be loudest. The table below lists all the notes, the setting value on Firefly, and the frequency of the note.

Note	Setting Value	Frequency (Hz)
C4	0	261.63
C#4/Db4	1	277.18
D4	2	293.66
D#4/Eb4	3	311.13
E4	4	329.63
F4	5	349.23
F#4/Gb4	6	369.99
G4	7	392.00
G#4/Ab4	8	415.30
A4	9	440.00
A#4/Bb4	10	466.16
B4	11	493.88
C5	12	523.25
C#5/Db5	13	554.37
D5	14	587.33
D#5/Eb5	15	622.25
E5	16	659.26
F5	17	698.46
F#5/Gb5	18	739.99
G5	19	783.99
G#5/Ab5	20	830.61
A5	21	880.00
A#5/Bb5	22	932.33
B5	23	987.77

Note	Setting Value	Frequency (Hz)
C6	24	1046.50
C#6/Db6	25	1108.73
D6	26	1174.66
D#6/Eb6	27	1244.51
E6	28	1318.51
F6	29	1396.91
F#6/Gb6	30	1479.98
G6	31	1567.98
G#6/Ab6	32	1661.22
A6	33	1760.00
A#6/Bb6	34	1864.66
B6	35	1975.53
C7	36	2093.00
C#7/Db7	37	2217.46
D7	38	2349.32
D#7/Eb7	39	2489.02
E7	40	2637.02
F7	41	2793.83
F#7/Gb7	42	2959.96
G7	43	3135.96
G#7/Ab7	44	3322.44
A7	45	3520.00
A#7/Bb7	46	3729.31
B7	47	3951.07
C8	48	4186.01

Extension Light Protocol

The extension light protocol uses 5 different single-byte messages that repeat at a rate of 200Hz (so each message gets updated at a rate of $200/5=40$ Hz). Serial settings are 4800 baud, no parity, 8 data bits, and 1 stop bit. The messages are described below:

Basic Message

The basic message includes touch lights (RV=right valid, LV=left valid, RI=right invalid, LI=left invalid), grounding lights (RG=right grounding, LG=left grounding), and buzzer (B). These messages are easy to recognize because the MSB will always be 1. Format:

7 (MSB)	6	5	4	3	2	1	0 (LSB)
1	B	RG	LG	RI	LI	RV	LV

Extended Message

The extended message (with MSB 0) contains information about the weapon and clock, with room for future expansion. The format of the message is:

7 (MSB)	6	5	4	3	2	1	0 (LSB)
0	M2	M1	M0	V3	V2	V1	V0

M is a 3-bit message type, and V is a four-bit value for that message. These extended messages are:

M=000: Weapon, Colon, Tens-of-Minutes (TM)

V3, V2	V1	V0
00=foil 01=épée 10=saber 11=unused	0=colon off 1=colon on	0=TM blank 1=TM 1

M=001 — M=011: Units-of-minutes (UM), tens-of-seconds (TS), units-of-seconds (US) For M=001 (UM), M=010 (TS), and M=011 (US), the four-bit value V represents the digit, with 1010 (10 decimal) representing “blank”.

Serial Control

Starting with firmware version 1-15, Firefly can be controlled via the serial port. Serial settings are 4800 baud, no parity, 8 data bits, and 1 stop bit, as they are in the Extension Light Protocol. The messages Firefly accepts are:

Character	Command
a (0x61)	AutoClock button.
A (0x41)	Long press of AutoClock button.
m (0x6D)	Mem button.
M (0x4D)	Long press of Mem button (currently unused).
w (0x77)	Weapon button.
W (0x57)	Long press of Weapon button.
f (0x66)	FlipCoin button.
F (0x46)	Long press of FlipCoin button (currently unused).
s (0x73)	Start/stop clock. This is identical to the start/stop button on the IR remote. As with the remote, AutoClock must be disabled to use this feature.