

## **LED CONVERSION BOARD - YAKUZA SERIES MARQ/VICE/VICTORY**

The LED conversion board replaces the OLED screen mini-board on your Yakuza Series board. Combined with new firmware, your board will function similarly to the Ebisu Series, using a multi-color LED to show the operating status. If your board has USB, you will be able to change settings using the Tengu USB interface. Both USB and non-USB boards can also change settings with the Ebisu/Musashi style LED programming mode.

### **INSTALLATION**

Installation of the LED conversion board must be carefully done to avoid damaging the electronics or wiring harnesses.

1. Remove the grip panels to expose the circuit board and remove the battery.
2. Gently pull the OLED screen mini-board off of the main board. A pair of friction based three pin connectors, one on each side of the screen, are all that secure it. It is important that the female sockets on the main board do not get bent or damaged.
3. Line up the new LED conversion board over the female three pin connectors on the main board. The LED conversion board orientation should have the three pin connectors at the top left and right sides, with the cut out notch on the lower left. Please refer to the pictures on the Tadao site product page for the conversion boards for additional clarification.
4. Gently press the LED conversion board into the three pin connectors on the main board.
5. If you have a USB board and have not done so already, update your board with the new conversion firmware using the Tengu USB interface. (See USB section below)
6. Replace the battery.
7. Replace the grip panels.

### **BOARD OPERATION**

Turn on the board by pressing the power switch.

The eye system is toggled on and off by pressing and holding the power switch until the LED changes colors (approximately 1 second).

Turn off the board by continuing to hold the power switch after the eye system toggles (approximately 2 seconds).

The multicolor LED will display different colors based on which mode of operation the marker is in:

Flickering Red – at boot time indicates an exhausted battery

Flickering Yellow – at boot time indicates a low battery

Flickering Green – at boot time indicates a good battery

2C eye system installed:

Solid Blue – eyes on, ball in breech, ready to fire

Slow Blinking Blue – eyes on, empty breech

Slow Blinking Red – eyes off

Slow Blinking Yellow – eye malfunction caused by the eyes not seeing the bolt cycle

4C eye system installed:

Solid Green – eyes on, both top and bottom eyes blocked, ready to fire

Solid Red – eyes on, top eye blocked

Solid Blue – eyes on, bottom eye blocked  
Slow Blinking Blue – eyes on, empty breech  
Slow Blinking Red – eyes off  
Slow Blinking Yellow – eye malfunction caused by the eyes not seeing the bolt cycle

The use of the 4C™ eye system allows for much faster rates of fire because it can anticipate the next paintball being loaded into the breech and start the firing cycle early, which negates the delay time found in the pneumatics of the paintball marker. The Ebisu software was written specifically to take advantage of this arrangement, and automatically uses the top eye set when the loader is feeding fast enough. It can also determine when the top eye set is blocked by paint or debris, and will default to using only the bottom eye until the top is clear again. Once the top eye is clear, it will resume use of both eye sets.

If used, the eye system cycles the marker as fast as possible. During each shot the eyes watch for the bolt to return, ending the current firing cycle and starting another as quickly as the pneumatics allow. If the eye system is continually blocked (e.g. putting your finger in front of the eyes) and is unable to see the bolt return after every shot, the max rate of fire will be reduced to prevent further chopping, and the LED will show an eye malfunction by slowly blinking yellow. Firing the marker with paint and air will utilize the eye system correctly, maximizing the rate of fire.

### **SELECT FIRE**

Select fire allows you to pick up to two different fire modes which can be cycled through during game play. The modes are chosen in the programming menu using the fire mode 1 and 2 settings. You can choose to use just one (which disables select fire), or two modes at a time.

If select fire modes are enabled, you can cycle through them during play by pressing and quickly releasing the power switch. The LED will flash purple once or twice to indicate which fire mode you are using as it changes. All fire modes share the same rate of fire setting, unless unlimited semi-automatic is chosen. This allows you to have combinations such as unlimited semi-automatic and 15 bps ramping.

**Unless specifically allowed, select fire functionality should not be used in tournaments. It is strongly advised to consult both tournament rules and local field regulations before use. Tadao Technologies LLC takes no responsibility for the user's choice in using select fire functionality.**

### **USB**

If your board has a mini-B USB socket, it will work with the Tengu USB interface, which can be downloaded online on the [Tengu webpage](#). Tengu allows you to update the firmware on your board and modify all the settings. To run the Tengu interface you need a mini-B USB cable and a PC running Windows 7/8, Vista, or XP. XP users will also need to download the Microsoft .NET Framework 3.5 or newer. Refer to the Tengu user guide for information regarding USB installation and using the Tengu USB interface.

### **MENU SYSTEM**

The Ebisu series boards use a color coded menu system. Each setting has its own LED color and/or sequence assigned to it. To enter the menu system, hold down the trigger while turning the board on. The LED will show a rainbow sequence, followed by the last viewed setting.

The tournament lock must be disabled in order to change settings on the board. While the marker is turned on (but not in programming mode), push and hold the lock button located on the surface

of the board. The LED will flash red or green to indicate the status of the lock. Red means the lock is on; green means the lock is off. When the lock and the marker are off, pull and hold the trigger, and turn the board on. The marker will boot into programming mode, showing a rainbow sequence before stopping at solid green. The board will remember the previously viewed setting after consecutive boots into programming mode.

Pull and release the trigger quickly to scroll forward through the settings. When the last setting is reached, it will wrap around to the beginning.

Green	Fire mode 1
Purple	Max rate of fire
Yellow	Fine rate of fire
Blue	Debounce
Red	Anti-mechanical bounce
White	Cycle percentage filter
Aqua	Dwell
Flickering Green	Anti-bolt stick
Flickering Purple	Ball in place delay
Flickering Yellow	Bolt delay
Flickering Blue	Eye mode
Flickering Red	Ramp start
Flickering White	Ramp percentage
Flickering Aqua	PSP/Millennium semi-shots
Double Blink Green	PSP/Millennium reset time
Double Blink Purple	G-mode breakout
Double Blink Yellow	Auto-off timer
Double Blink Blue	Fire mode 2 (for select fire)
Alternating Yellow/Blue	Save current settings to profile 1-5
Alternating Yellow/Green	Load profile 1-5 to current settings
Alternating Yellow/Red	Reset active settings to defaults (does not reset profiles)

When the LED is lit for the desired setting, press and hold the trigger until the LED goes out. When you release the trigger, the LED will blink to show the current setting. For example, if the current setting for debounce is 5, the LED will blink green 5 times. Once the LED stops blinking, you have 2 seconds to begin entering the new setting. To enter the new setting, pull the trigger the desired number of times. For example, to set the debounce to 2, you must pull the trigger 2 times. Every time you pull the trigger the LED will light. After all settings have been changed, turn the marker off using the power switch.

Since some settings may have a very high value, it is not necessary to watch the entire blinking sequence. You can bypass this by pulling the trigger one time during the blinking sequence. You can then begin entering a new value. The trigger pull that cancels the blinking sequence does not count towards the new value you enter.

### **Programming Example**

If you want to set the max rate of fire to 20 bps, you should:

1. Make sure the marker is powered off and the tournament lock is disabled.
2. Pull the trigger and turn on the marker.
3. The LED shows a rainbow sequence then stops on solid green, which is the fire mode setting (unless previously changed to another setting before turning off the board).
4. Use the trigger to cycle through the settings until you reach the max rate of fire setting (solid purple).

5. Pull and HOLD the trigger until the LED turns off.
6. Release the trigger. The LED will blink out the current setting (10 blinks to indicate 10 bps).
7. When the LED stops blinking, enter the new setting by pulling the trigger 20 times.
8. Wait until the LED turns back on, indicating programming has been completed.
9. Turn the marker off.

## SETTINGS

### **Fire mode 1 (default semi-automatic unlimited):**

1. Semi-automatic unlimited
2. Semi-automatic adjustable
3. PSP ramping - 123-shots semi, on 4<sup>th</sup> shot ramps, resets after 1 second
4. PSP burst - 123-shots semi, on 4<sup>th</sup> shot fires 3-round burst, resets after 1 second
5. NXL full-automatic - 123-shots semi, on 4<sup>th</sup> shot fires full-auto, resets after 1 second
6. Millennium ramping - 123-shots semi, on 4<sup>th</sup> shot ramps, resets after 250 ms
7. Custom ramping - user adjustable ramping, select ramp start and ramp percentage
8. Auto response: - fires on each pull and release
9. Burst - 3-round burst
10. Full-automatic - fires full-automatic, resets after 1 second

**Maximum rate of fire (default 10 bps, range 5-30 and infinity):** The semi-automatic unlimited fire mode ignores this value, making it easy to switch back and forth between tournament gun rules without modifying more than 1 setting. Infinite setting only applies to eyes on; eyes off will still be limited to 30 bps.

**Fine rate of fire timing (default 0.0, range 0.0 to 0.9 additional bps):** Fine adjustment of the max rate of fire in 0.1 bps increments, from 0.0 to 0.9 additional bps.

**Debounce (default 5 ms, range 0.5-25.0 ms):** The amount of time the trigger must be released for the microcontroller to allow the next trigger pull. It uses an asynchronous interrupt based scan at up to 16 million times per second that is run independently from code execution. Higher values reduce bounce. Remember that each blink represents 0.5 milliseconds, so the default of 5.0 milliseconds will blink 10 times.

**Anti-mechanical bounce (default 1, range 1-4):** Helps eliminate mechanical bounce which can cause a loosely held paintball marker to go full-auto.

**Cycle percentage filter (default 10%, range 10-90% or off):** Secondary debounce filter, adjusts when buffered shots are allowed. Higher values reduce bounce. 1 blink = off, 10 blinks = 90%.

**Dwell (default 6 ms, range 0.5-25.0 ms):** The amount of time the solenoid is energized during each firing cycle. Lower is less consistent; higher is less efficient. Remember that each blink represents 0.5 milliseconds, so the default of 6.0 milliseconds will blink 12 times.

**Anti-bolt stick (default off, range 1-10 ms):** If the marker sits for more than 20 seconds, ABS adds extra dwell to the next shot to prevent first shot drop off.

**BIP delay (default 1, range 1-10 ms):** A slight delay that allows each paintball to settle in the breech before firing.

**Bolt delay (default 14, range 1-25 ms):** A delay that gives the bolt enough time to block the eyes on the forward stroke. Too low will cause blank or skipped shots. Too high can slow down the marker.

**Eye mode (default forced):**

1. Forced with force shot – marker only fires when a paintball is present or a force shot is initiated by holding down the trigger for ½ second.
2. Delayed – the eyes will watch for a paintball for up to 500 ms after each pull, then fire.

**Ramping start (default 5, range 4-14 pulls per second):** How fast you pull for the ramping fire modes to start adding additional shots. Ramping modes only.

**Ramping percentage (default 500%, range 10-500%):** Adjusts how much the software helps the user while ramping. A 50% ramp adds 50% of the user's pulling rate to the current rate of fire. (i.e. pull 8 times per second and the gun will fire 12 times per second)

**PSP/Millennium mode semi shots (default 3, range 1-5 shots):** Sets the number of semi-automatic shots before ramping begins in any of the PSP or Millennium fire modes.

**PSP/Millennium mode reset time (default 900 ms, range 200-2000 ms):** Adjusts the reset time for any of the PSP or Millennium fire modes when the user stops shooting, before it reverts back to the initial semi-automatic shots as selected in the previous setting.

**G mode or “breakout mode” (default off):** Provides unlimited full-auto, reverting to the user-selected fire mode on the 1<sup>st</sup>, 2<sup>nd</sup>, or 3<sup>rd</sup> shot after turning on the board. Breakout modes are illegal for use in all tournament series. Tadao Technologies LLC takes no responsibility for the use of breakout modes.

**Auto-off timer (default 30 minutes, range 5 to 60 minutes, or disabled):** Adjusts how long the board must sit idle before automatically powering down to conserve batteries. Each blink is 5 minutes, with a setting of 13 blinks disabling the auto-off timer.

**Fire mode 2 (default disabled):** Allows the user to select a secondary fire mode which can be cycled through during play. Any fire mode can be chosen from the normal fire mode list, or it can be set to none to disable select fire functionality.

1. Semi-automatic unlimited
2. Semi-automatic adjustable
3. PSP ramping - 123-shots semi, on 4<sup>th</sup> shot ramps, resets after 1 second
4. PSP burst - 123-shots semi, on 4<sup>th</sup> shot fires 3-round burst, resets after 1 second
5. NXL full-automatic - 123-shots semi, on 4<sup>th</sup> shot fires full-auto, resets after 1 second
6. Millennium ramping - 123-shots semi, on 4<sup>th</sup> shot ramps, resets after 250 ms
7. Custom ramping - user adjustable ramping, select ramp start and ramp percentage
8. Auto response: - fires on each pull and release
9. Burst - 3-round burst
10. Full-automatic - fires full-automatic, resets after 1 second
11. Select fire disabled

**Save current settings to profile 1-5:** Allows the user to save the currently selected settings as 1 of 5 profiles, which can be loaded again later. These profiles can also be configured using the Tengu USB interface. To use: pull and hold the trigger until the LED turns off. Release the

trigger. The LED will blink once. Enter in the profile number to which you would like to save the current settings by pulling the trigger the desired number of times.

**Load profile 1-5 to current settings:** Allows the user to load 1 of the saved profiles to the current settings. To use: pull and hold the trigger until the LED turns off. Release the trigger. The LED will blink once. Enter in the profile number you would like to load to the current settings by pulling the trigger the desired number of times.

**Reset:** Allows the user to restore the active settings to their default values. Profiles will not be changed. To use: pull and hold the trigger until the LED starts flickering to indicate that the reset has begun. Release the trigger. Once the LED returns to the alternating yellow/red sequence, the reset has completed.