



## Odoshi G6R Board Instructions

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### Features

- Based on the Musashi 8 software, with full support for the 4C™ eye system
- Includes 3 fire modes: uncapped semi-auto, capped semi-auto, and PSP/Millennium ramping.
- Programming mode allows changes to debounce, dwell, loader delay, fire mode, max rate of fire, and bolt delay.
- All settings are stored in non-volatile memory so they are not lost when battery is disconnected
- One-touch startup enables the marker to fire instantly
- Automatic 20 minute idle power down saves batteries
- Low battery indicator hardware and software shows battery level each time the marker is turned on

### LED Indicator

The multi-color LED that shines out the side of the grips shows which mode of operation the marker is currently in:

Rapid Blinking Red	At startup this indicates an exhausted battery
Rapid Blinking Yellow	At startup this indicates a low battery
Rapid Blinking Green	At start this indicates a good battery
Solid Green	Both top and bottom eye blocked (with 4C eyes)
Solid Red	Top eye blocked (with 4C eyes)
Solid Blue	Bottom eye blocked
Slow Blinking Blue	No ball in breech
Slow Blinking Yellow	Eye malfunction, max rate of fire reduced to 8 bps; clean eyes or make sure the gun is fired with paint and air
Slow Blinking Red	Eyes disabled

### Power and Eye Operation

Pressing and releasing the power button turns the marker on. The battery indicator will show the current power level of your battery with a flickering red, yellow, or green LED. After the battery indicator is displayed the LED will show the breech status according to the above listed colors.

To turn the eye system off press and hold the power button until the LED changes to slow blinking red (approximately 1 second).

To turn the board off continue to hold the power switch after the eye system toggles, until the LED turns off (approximately 2 seconds).

The eyes are enabled when the marker is first turned on. The Odoshi G6R board supports the 4C™ eye system, and will automatically detect whether a single eye set or dual eye set is installed at start up.

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 Musashi 8 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 about 8 balls per second to prevent further chopping, and the LEDs will blink yellow to indicate the eye malfunction. Firing the marker with paint and air will utilize the eye system correctly, maximizing the rate of fire.

To determine if the eyes are working correctly, insert an object into the breech. Check to see if the LED changes from blinking blue to solid and then back to blinking blue once the object is removed.

### Programming

The tournament lock must be disabled in order to change settings on the board. The lock switch is located underneath the mounting boss near the battery terminals. It can be accessed with an allen wrench or other object that can fit through the provided hole. While the marker is turned off, press the lock button. The LED will flash red or green to indicate the status of the lock. Red means the lock is on, while green means the lock is off. When the lock and the marker are off, pull and hold the trigger, then push the power button. The marker will boot into programming mode, showing a rainbow sequence before stopping at solid green.

Pulling and releasing the trigger quickly will toggle between the different programming modes:

Green	Debounce
Purple	Dwell
Yellow	Loader delay
Blue	Fire mode
Red	Fire mode max rate of fire
White	Bolt delay

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 button.

## Programming Example

If you want to set the dwell to 8, you should:

1. Make sure the marker is powered off and the tournament lock is disabled.
2. Pull the trigger and push the power button to turn on the marker.
3. The LED shows a rainbow sequence then stops on solid green. This is the debounce mode.
4. Quickly pull and release the trigger 1 time to switch to the dwell mode.  
The LED will show purple.
5. Pull and HOLD the trigger until the LED turns off.
6. Release the trigger. The LED will blink out the current setting.
7. When the LED stops blinking, enter the new setting by pulling the trigger 8 times.
8. Wait until the LED turns back on, indicating programming has been completed.
9. Turn the marker off.

## Program Reset

To reset all settings to factory defaults, hold down the lock button for 10 seconds while in programming mode. The LED will rapidly cycle through every setting color to indicate that the process has completed.

### Settings

**Debounce** – The Odoshi G6R board features an interrupt based debounce algorithm that effectively “scans” the trigger over 2 million times per second. It runs this completely independent of code execution on the microcontroller so your trigger pulls are always registered. The debounce setting is in increments of 1/2 milliseconds. Users should be aware that low debounce settings may cause the marker to read switch bounce as additional pulls, falsely generating shots or near full-automatic fire. The setting ranges from 1 to 50 and is defaulted at 10 (5 ms).

**Dwell** – The amount of time the solenoid is energized each time the marker is fired. The default is 6 ms. The range is 2 to 20 ms. Too low of a dwell may lead to inconsistency or drop-off. Too high of a dwell can cause bad air efficiency.

**Loader delay** – Adds a slight delay after the eye has seen a ball and the bolt is cycled, causing the gun to fire. If not using force fed loaders, it may be necessary to increase this setting to prevent chopping. A setting of 1 means no loader delay, which is the fastest. The default is 2 and may be set from 1 to 25.

**Fire mode** – Included are 3 different fire modes (default is 1):

1. Semi-automatic, unlimited rate of fire
2. Semi-automatic, adjustable rate of fire
3. PSP/Millennium ramping

Setting 1 is normal semi-automatic with an unlimited rate of fire while the eyes are enabled. When the eyes are turned off, the max rate of fire is set to 25 balls per second.

Setting 2 is semi-automatic with an adjustable rate of fire. It limits the maximum balls per second that can be fired. The cap is set by the max rate of fire setting.

Setting 3 is the PSP/Millennium ramping fire mode that works as follows:

- The first 3 shots of a string are semi-automatic
- After the 4th shot the marker will ramp up to the loader’s maximum speed or the maximum rate of fire, as long as the user pulls the trigger faster than the 5 times per second
- If the user stops firing for more than 1 second, the 3-shot semi-automatic count starts over

**Fire mode max rate of fire** – The max rate of fire setting applies to the

2<sup>nd</sup> and 3<sup>rd</sup> fire modes. The max rate of fire is adjustable from 10 to 25 balls per second, and has an unlimited setting for maxing out the loader system. The default is 6, which is roughly 12.5 balls per second. Oscillator inconsistencies from chip to chip make it impossible to time perfectly, so the only true way to check rate of fire is to use a Pact Timer or ballistic chronograph. The red radar chronographs commonly found at fields are NOT reliable.

Setting	BPS	Setting	BPS
1	10.0	12	15.5
2	10.5	13	16.0
3	11.0	14	17.0
4	11.5	15	18.0
5	12.0	16	19.0
6	12.5	17	20.0
7	13.0	18	21.0
8	13.5	19	22.0
9	14.0	20	23.0
10	14.5	21	24.0
11	15.0	22	Unlimited eyes on, 25.0 bps eyes off

**Bolt delay** – This setting determines how long the eyes are ignored after the dwell time ends. Some delay is necessary to allow the bolt to get far enough forward so the eye system does not mistake a small gap between a paintball and the bolt face for a bolt return. The default is 14 ms and may be set from 1 to 25 ms. Higher settings will reduce the maximum capable rate of fire, while lower settings may lead to skipped or blank shots because the bolt does not have enough time to block the eyes on its forward stroke.

### Additional Features

**Force Shot** – In the event the eyes are enabled, the breech is empty, and the user wants to fire a clearing shot, a force shot can be initiated by pulling and holding the trigger for 1/2 second. This is useful with force fed loaders that sometimes push a ball slightly into the detents where the eyes are unable to see it. After force firing, the next ball will load, and operation will continue as normal.

### Additional Information

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