



M5 Intimidator Board Instructions

Features

- Fully functional in 2K2 or GZ style Intimidator frames
- Based on the Musashi 5 software
- Includes 5 fire modes: uncapped semi-auto, capped semi-auto, PSP ramping, PSP burst, and NXL full-automatic
- Continuously monitors the trigger switch throughout the entire firing cycle
- AMB (anti-mechanical bounce) and CPF (cycle percentage filter) algorithms help to eliminate mechanical bounce and switch bounce
- Power efficient software lengthens battery life
- Programming mode allows changes to debounce, dwell, loader delay, AMB, eye mode, bolt delay, fire mode, max rate of fire, cycle percentage filter, and ramp start
- 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
- Delayed and forced eye mode with force shot allows the marker to be fired when the eyes are enabled but no object is present in the breech
- Low battery indicator software

Installation

The Tadao Intimidator Board is a drop-in upgrade. Installation consists of removing the old board and putting in the new one:

1. Remove the left half of the 2K2 Intimidator frame. The stock circuit board is exposed.
2. Unscrew the bottom mounting screw.
3. Gently lift up the stock board and unplug the LCD ribbon and two wiring harnesses.
4. Reconnect the wiring harnesses to the Tadao Intimidator Board. The top 12 pin connector may need to be reversed for the eye system to function correctly. **If the eye system does not work then the 12 pin connector is installed backwards.**
5. Place the Tadao Intimidator Board back into the grip frame on top of the solenoid, making sure all the wires are tucked underneath the board so they are not pinched when the frame is reassembled.
6. Thread the bottom board mounting screw in but only make it snug.
7. Reattach the left side of the grip frame.
8. Readjust the trigger set screws as necessary.

LED Indicator

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

Solid Green	Ball in breech, ready to fire
Solid Red	No ball in breech
Slow Blinking Green	Eye malfunction, max rate of fire reduced
Slow Blinking Red	Eyes disabled, rate of fire limited to 20 balls per second in uncapped semi-auto; otherwise capped at fire mode max rate of fire for fire modes 2-5

Power Operation

Sliding the power switch turns the marker on. If the battery is low, the LED will flicker red. If the battery is fine, it will show a green or red LED in the grip frame to indicate that the marker is ready to be fired. Every time the marker is turned on, the eyes are enabled. The marker can be turned off regardless of the state of the eyes. See "Battery Indicator" section for additional details.

Eye Operation and Logic

The eyes are enabled when the marker is first turned on. The eyes can be turned off by pushing the bolt forward and firing 5 times. If the marker is not aired up, you can also block the eyes for 5 shots in a row to turn off the eyes.

Note that the eye logic can tell the difference between paint being fired and an object constantly blocking the eyes. The eyes watch for the bolt to return every shot. If this does not happen, the LED will flash green to indicate an eye malfunction. Unblocking the eyes will cause it to revert to a solid red LED to show that the eyes are working again and the breech is empty. If the eyes are continually blocked for 5 shots in a row, the eye system will automatically disable. If you are firing the marker with paint and air, and the eye system is working, the eyes will not disable automatically since they will see the bolt returning every shot.

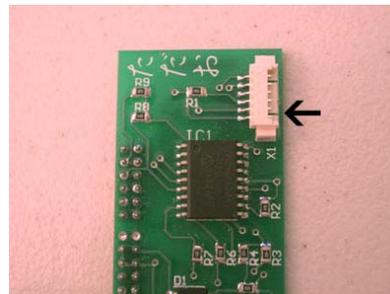
To determine if the eyes are working correctly, insert an object into the breech. Check to see if the LED changes from solid red to solid green and then back to solid red once the object is removed.

Battery Indicator

The battery indicator software is standard on the Tadao Intimidator Board. When the marker is turned on, the LED may briefly flicker red to indicate a low battery, and it should be changed as soon as possible. Your battery may last for another case of paint, but it is close to failing. If the battery is fine, the software will go directly into the firing mode.

Programming

The tournament lock must be disabled in order to change settings on the board. The tournament lock is toggled by making sure the marker is turned off, then shorting the bottom 2 pins on the programming connector and power cycling the maker (turning it on, then off):



To toggle the tournament lock:

1. Turn the marker off.
2. Touch the top two pins of the programming connector with a conductive object.
3. Turn on the marker while maintaining contact with the two pins.
4. The LED will blink twice: either red (lock ON), or green (lock OFF).
5. Turn the marker off.

By default the tournament lock is disabled, allowing the user to change settings.

While the marker is turned off, press and hold the trigger and turn the marker on. This will initiate the programming mode, flashing through a rainbow sequence and then finally showing solid green.

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

- | | |
|-----------------------------|----------------------------|
| 1. Green | Debounce |
| 2. Red | Dwell |
| 3. Orange | Loader delay |
| 4. Flickering Green | AMB |
| 5. Flickering Red | Bolt delay |
| 6. Flickering Orange | Eye mode |
| 7. Alternating Red/Green | Fire mode |
| 8. Alternating Red/Orange | Fire mode max rate of fire |
| 9. Alternating Green/Orange | Cycle percentage filter |
| 10. Flickering Red/Green | Ramp start |

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 10, you should:

1. Make sure the marker is powered off and the tournament lock is disabled.
2. Push and hold the trigger and turn on the marker. The LED goes through a rainbow sequence then shows green. This is the debounce mode.
3. Quickly pull and release the trigger 1 time to switch to the dwell mode. The LED will show red.
4. Pull and HOLD the trigger until the LED turns off.
5. Release the trigger. The LED will blink out the current setting.
6. When the LED stops blinking, enter the new setting by pulling the trigger 10 times.
7. Wait until the LED turns back on, indicating programming has been completed.
8. Turn the marker off.

Settings

Debounce – The Musashi software features a hybrid debounce scheme that uses microcontroller cycles to debounce the pull of the trigger and ½ ms time increments to debounce the release. This results in a very effective debounce algorithm that does not hinder the user at any setting. At low debounce settings, however, it 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.

Dwell – The amount of time the solenoid is energized each time the marker is fired. The default is 8 ms. The range is 1 to 30 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 30.

AMB – Allows the user to adjust the anti-mechanical bounce feature. Mechanical bounce occurs due to the kick generated during each shot and can cause the marker to “run away” on the first few shots. AMB helps stop markers from going full-auto when the trigger is pulled very slowly. The default is 2 and may be set from 1 to 5 (1 being off). AMB is only used in fire modes 1 and 2 (semi-automatic unlimited and adjustable). In PSP ramping, PSP burst, or NXL mode AMB is disabled.

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 move 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 15 ms and may be set from 5 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.

Eye Mode – This setting selects the eye mode. The default is 1, which is delayed. In delayed mode the eyes will watch for a ball up to ½ second after the trigger is pulled. After ½ second the marker will fire whether or not a ball is in the breach. If set to 2, the eye mode is forced. In forced mode the marker will not fire unless a ball is present in the breach or a force shot is utilized. The user can fire a force shot by holding down the trigger for ½ second.

Fire Mode – Included are 5 different fire modes (default is 1):

1. Semi-automatic, unlimited rate of fire
2. Semi-automatic, adjustable rate of fire
3. PSP ramping, adjustable rate of fire
4. PSP burst, adjustable rate of fire
5. NXL full automatic, adjustable rate of fire

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 20 balls per second.

Setting 2 is semi-automatic with a capped rate of fire. It limits the maximum balls per second that can be fired. The cap is set by the Max ROF setting.

Setting 3 is the first PSP fire mode that works as follows:

- The first 3 shots of a string are semi-automatic
- After the 4th shot the marker will add shots as long as the user fires faster than the ramp start setting. For instance, if the ramp start setting is 5, then the user must pull 5 times per second or faster for the software to add additional shots.
- If the trigger is released, the marker will stop firing immediately
- If the trigger is not pulled again within 1 second of release, the 3-shot semi-automatic count starts over

Setting 4 is the second PSP fire mode that works as follows:

- The first 3 shots of a string are semi-automatic
- After the 4th shot the marker will fire 2 or more shots per pull as long as the user continually pulls and releases the trigger
- If the trigger is released, the marker will stop firing immediately
- If the trigger is not pulled again within 1 second of release, the 3-shot semi-automatic count starts over

In normal operation, continually pulling the trigger faster than 5 to 6 pulls per second will effectively give the user full-automatic at the max rate of fire. If the user stops shooting then resumes within 1 second, the marker will return to the max rate of fire. If the user stops shooting for more than 1 second, the next 3 shots will be semi-automatic. On the 4th shot it will resume a faster fire rate.

PSP ramping and PSP burst differ in that PSP ramping requires the user to maintain the ramp start rate of fire for software assistance, whereas the PSP burst mode will fire at least 2 shots per pull, regardless of rate of fire. Some players prefer multiple shots every time they pull the trigger after the initial 3 semi-automatic shots, while others like to be able to shoot 1 ball at a time until they achieve a certain rate of fire.

Setting 5 is the NXL full-automatic fire mode. It functions similarly to the PSP fire modes except after the 3rd semi-automatic shot the user may pull and hold the trigger to have the marker fire in full-automatic.

Fire Mode Max ROF – The maximum rate of fire setting only applies to the 2nd, 3rd, 4th, and 5th fire modes. The max rate of fire is adjustable from 14 to 20 balls per second in ¼ balls per second increments, and has an unlimited setting. The default is 4, which is roughly 14.75 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	Setting	BPS
1	14.0	9	16.0	17	18.0
2	14.25	10	16.25	18	18.25
3	14.5	11	16.5	19	18.5
4	14.75	12	16.75	20	18.75
5	15.0	13	17.0	21	19.0
6	15.25	14	17.25	22	19.25
7	15.5	15	17.5	23	19.5
8	15.75	16	17.75	24	19.75
				25	20.0
				26	Unlimited eyes on 20 bps eyes off

Cycle Percentage Filter (CPF) – The cycle percentage filter allows adjustment of the point within the current firing cycle that a new buffered shot is allowed. Almost all electronic paintball markers allow a single shot to be buffered in the event the user is fast enough to release the trigger and pull again during the current firing cycle. The CPF setting is adjustable from 1 to 10. Setting 1 turns the CPF off, allowing buffered shots at any point in the firing cycle. Settings 2 through 10 set the percentage of the firing cycle that must pass before shots may be buffered:

1	CPF turned off
2	10% of the firing cycle must pass before a buffered shot is allowed
3	20%
4	30%
5	40%
6	50%
7	60%
8	70%
9	80%
10	90%

A higher CPF setting results in less unintentional bounce. For instance, it is possible that if your debounce setting is border line, you can fire the marker a few times, then hold it loosely and allow it to brush against your finger, going full-automatic. Since most switch bounce from either a low debounce setting or mechanical bounce occurs almost immediately after the trigger is released, CPF can be very effective in eliminating falsely generated trigger activity.

Ramp Start – The ramp start setting is only used for the PSP ramping fire mode (mode 3). It sets the minimum pulls per second that must be maintained for the software to add shots, or ramp up to the maximum rate of fire setting. The default is 5 and is adjustable from 4 to 12 pulls per second.

Additional Features

Force Shot (while in forced eye mode only) – 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 ½ second. This is useful with forced 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.

A tip for setting the debounce, AMB, and CPF – This only applies to semi-automatic fire modes (modes 1 and 2), since AMB is disabled in the PSP fire modes or NXL mode.

Debounce, AMB, CPF setup steps, while using air (no paint):

1. Turn AMB and CPF off (set both to 1).
2. Starting at debounce 1-3, raise the debounce setting a notch at a time until excessive trigger bounce goes away. The goal is to have one pull, one shot, regardless of rate of fire. Do NOT slow pull test for bounce during this phase. Instead, pull the trigger rapidly or walk it, listening for double or triple fires.
3. When it appears that it is only one pull, one shot for solid trigger pulls, try the slow pull test. Holding the marker steady, slowly pull the trigger and see if multiple shots can be generated from the single pull.
4. Increase the CPF setting a notch at a time until the slow pull bounce starts to disappear. An additional test is to fire a few rounds quickly, then hold the trigger right on the activation point to see if the marker will run away.
5. If you reach setting 10 with CPF and the marker can still be slow pulled to fire full-automatic, then your debounce setting is probably too low. Go back to step 2.
6. AMB should not be set above 3, if possible, since it is not as transparent to the user as CPF. Even a CPF setting of 10 will not be noticed by the user.

Example Setting Profiles:

1. Tournament legal semi-automatic (NPPL)
 - a. Fire mode 1 or 2 (semi-auto unlimited or capped)
 - b. Debounce 5-20
 - c. CPF 2-5
 - d. Loader delay set to match your loader (1-4 for Halo, 4-10 for gravity feed)
2. Millennium
 - a. Fire mode 3 (PSP ramping)
 - b. Max rate of fire set to 3-5, depending on Pact Timer readings. To be safe use setting 3 (14.5 balls per second)
 - c. Debounce 5-20
 - d. Ramp start 8 or higher to comply with Millennium rules
 - e. Loader delay set to match your loader (1-4 for Halo, 4-10 for gravity feed)
3. PSP X-Ball, CFOA
 - a. Fire mode 3 or 4 (PSP ramping or PSP burst)
 - b. Max rate of fire set to 3-5, depending on Pact Timer readings. To be safe use setting 3 (14.5 balls per second)
 - c. Debounce 5-20
 - d. Ramp start 5 or higher if using PSP ramping.
 - e. Loader delay set to match your loader (1-4 for Halo, 4-10 for gravity feed)
4. NXL
 - a. Fire mode 5 (NXL full-automatic).
 - b. Max rate of fire set to 3-4, depending on Pact Timer readings. To be safe use setting 3 (14.5 balls per second).
 - c. Debounce 5-20
 - d. Loader delay set to match your loader (1-4 for Halo, 4-10 for gravity feed)
5. Ludicrous Speed (absolute fastest/bounciest)
 - a. Any fire mode

- b. Max rate of fire set to 26 (unlimited)
- c. Debounce 1
- d. CPF 1
- e. Ramp start 4 if using PSP ramping
- f. Loader delay 1

Additional Information

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