Dynasty Shocker™ Board Instructions

Built on the M3 Software

Features

- Built on the Musashi code base (hybrid debounce scheme)
- Includes 3 fire modes: uncapped semi-auto, capped semi-auto, and PSP ramping
- Continuously monitors the trigger switch throughout the entire firing cycle
- Adjustable ABS programming prevents first shot drop off
- Adjustable AMB algorithms help to eliminate mechanical bounce
- Power efficient software lengthens battery life
- Programming mode allows changes to debounce, dwell, loader delay, AMB, ABS, fire mode, and fire mode max rate of fire
- All settings are stored in non-volatile memory so they are not lost when power is disconnected
- One-touch startup allows the marker to fire instantly with the eyes enabled
- Automatic 15-minute power down prevents accidental wasted batteries
- Force shot function allows the marker to be fired when the eyes are enabled but no object is present in the breech

Installation

1. Remove the grips from the grip frame.
2. Push out the two steel retaining pins that are slightly below and forward of the top grip screw.
3. Unplug the battery from the stock board's wiring harness.
4. Gently pull back on the top half of the stock board so the trigger switch can clear the frame.
5. Rotate the stock board out of the frame to one side, starting from the bottom of the board.
6. Unplug the 10-wire cable from the back of the stock board.
7. Plug the 10-wire cable into the Dynasty board.
8. Insert the Dynasty board into the frame, starting with the top half that has the trigger switch. The trigger switch should face the trigger.
9. Rotate the Dynasty board into the frame. The edge of the Dynasty board slides into a retaining slot at the bottom of the grip frame.
10. Look through the 2 retaining pin holes and line up the trigger switch. Insert the 2 steel retaining pins into the frame and through the trigger switch mounting holes.
11. Plug the battery into the Dynasty board's wiring harness.
12. Make sure the 10-wire cable is tucked up and out of the way of the power switch. Insert the battery into the frame.
13. Put the grips back on the frame.

Power Operation

By pressing and releasing the power button, the marker turns on and is instantly ready to be fired, as indicated by a blue LED in the grip frame. To turn it off, press and hold the power button until the LED turns off or stops blinking, then release. Every time the marker is turned on, the eyes are enabled. The marker can be turned off regardless of the state of the eyes.

Eye Operation

The eyes are always enabled when the marker is first turned on. To toggle the eyes on and off, push and release the power button quickly. The LED will change from a solid blue to a blinking blue to indicate the eyes are disabled. The eye system watches the bolt return after every shot. If this doesn't happen (either from you blocking the eye with your finger, or due to broken paint/debris) then the rate of fire will be capped to prevent additional chopping. If the marker is fired with paint and air then the eye system will see the bolt return, and maximize the firing rate of the marker. When the eyes are off, the rate of fire is limited to 20 balls per second unless in fire mode 2, or 3, in which case the rate of fire is selected by the user.

Programming

While the marker is turned off, push the side mounted switch on the circuit board. This will initiate the programming mode, showing solid green on the programming LED located on the backside of the board.

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

Green	Debounce
Purple	Dwell
Yellow	Loader Delay
Blue	AMB
Red	ABS Dwell
White	Fire Mode
Teal	Fire Mode Max Rate of Fire

While the LED is lit for the desired setting you would like to change, press and hold the trigger until the LED goes out. When you release the trigger, the LED will show the current setting by blinking. 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. After all settings have been changed to the desired amounts, turn the marker off using the power button.

Programming Example

If you wanted to set the dwell to 12:
1. Make sure the marker is powered off.
2. Open the left side of the grips.
3. Push the side mounted programming switch.
4. The programming LED shows green. This is the debounce mode.
5. Quickly pull and release the trigger one time to switch to the dwell mode. The LED will show purple.
6. Pull and HOLD the trigger until the LED turns off.
7. Release the trigger. The LED will blink out the current setting.
8. When the LED stops blinking, enter the new setting by pulling the trigger 12 times.
9. Wait until the LED turns back on, indicating programming has completed.
10. Turn the marker off using the power button.

Program Reset

To reset all settings back to factory defaults, hold down the program 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 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 14 ms. The range is 1 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 50.

AMB – Allows the user to adjust the anti-mechanical bounce feature. Mechanical bounce occurs with the Shocker™ due to the kick generated during each shot and can cause the marker to "run away," firing even after the trigger has been released. 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. AMB is only used in fire modes 1 and 2 (semi-automatic unlimited and capped). In PSP mode AMB is disabled.

ABS Dwell – Amount of dwell time added for an ABS shot. The range is from 1 to 10 additional milliseconds of dwell. The default is 1. For a more detailed explanation of ABS see the "Additional Features" section.

Fire Mode – Included are three 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

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 PSP ramping 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 continues to pull the trigger
- If the trigger is let go, the marker will immediately stop firing
- If the trigger is not pulled after letting go within 1 second, 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 rate of fire.

Fire Mode Max ROF – The maximum rate of fire setting only applies to the 2nd and 3rd fire modes. The max rate of fire is adjustable from 14 to 20 balls per second in ¼ balls per second increments. There is also 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 w/eyes on

Additional Information

Force Shot feature – 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 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 can continue as normal.

A tip for setting the debounce and AMB – Although AMB is meant as a safety feature to stop runaway markers, it also has the unfortunate side effect of hiding bounce. To test your marker for bounce, shoot it as fast as possible with a single finger. If you have bounce, you'll see and hear double shots for individual pulls. This means you need to turn up your debounce. The slow pull test in use by some judges is not realistic for finding guns that have the debounce set too low.

A tip for setting the dwell and ABS dwell – Lower dwell times will decrease the sound output and increase the efficiency of a Shocker™. Try turning down the dwell 1 ms at a time until the marker will no longer cycle, then go back up. Now shoot with paint over a chronograph. After setting it around 290-300 feet per second, watch the consistency while shooting slowly and see if there is drop off while shooting fast. If you experience greater than a 20 feet per second swing or you have drop off while shooting fast, increase the dwell until this goes away.

Your ABS dwell time is the additional dwell time added when an ABS shot occurs. If you leave your marker on and don't fire for 15 seconds, ABS will kick in for the next shot, adding the ABS dwell time to the existing dwell setting. For example, if the dwell is set to 8 ms and the ABS dwell is set to 5 ms, an ABS shot will fire with a 13 ms dwell time. Additional shots will use the 8 ms dwell time until the marker has not been fired for another continuous 15 seconds. This setting is adjustable, so you can tune it to fit your particular marker. Stock bolts will almost always fire a slightly higher velocity shot with ABS, but the HE and Evolve bolts will not if their o-rings are in good condition.

Vision Eye Troubleshooting – The Dynasty board changes the eye logic so it works like a break beam system. If an object is in front of the sensor, it detects it and allows the marker to fire. If you install the Dynasty board and the vision acts as if an object is always in the breech, then the vision sensor is "seeing" the top edge of the breech wall. The stock board works fine in this case because it only sees movement, so the overlapping breech wall is not detected as a ball.

There are multiple ways to remedy this problem. First, try taking off the vision side ball detent and eye cover. Loosen the vision ribbon retaining screw and move the ribbon down as far as it will go. Retighten the screw. If your vision functions fine, then the sensor was moved down far enough to let it clear the breech wall. If this does not fix the problem, try a new vision ribbon, since the angle that the sensor is attached to the ribbon varies greatly from batch to batch. As a last resort an experienced airsmith can change the angle of your vision sensor with a soldering iron, or use a grinding tool to shave away the upper part of the breech wall that is blocking the vision sensor.

Additional Information

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