

Rabid Code

Promaster tournament firmware v1.5

Last updated Apr 22 2008

SIMPLE INSTRUCTIONS

- 1) Point barrel at bad guy
- 2) Pull trigger
- 3) Repeat

For all other issues, contact your team tech.

DETAILED INSTRUCTIONS

Introduction

Rabid Code is a replacement firmware package for the ICD Promaster, which adds numerous features and tournament modes to the marker. Normal use of your Promaster with Rabid Code is very straightforward; however adjusting the modes and settings can be tricky, so please read this manual in full before starting.

Usage

When the marker is turned on normally, the Paintball Detection System (PDS) will be active. After a short delay the LED next to the power button will blink once per second to indicate that the marker is live, and the PDS is active. If, while playing, the PDS fails (for instance if broken paint obscures the eye) then the PDS will be automatically bypassed and the marker will shoot at a reduced rate of fire to avoid paint breakage. When this happens the LED will blink 3 times in rapid succession, once per second. If the PDS recovers, it will be automatically re-enabled and the marker will return to normal mode. After this the LED will blink twice per second to indicate that a PDS failure had occurred but has been recovered from.

Manually Bypassing the PDS

To manually bypass the PDS, DIP4 must be in the Tournament Lock position (off). Hold down the trigger as the marker is turned on. After approx. 2 seconds the LED will start blinking rapidly. Release the trigger and the marker will be ready to shoot, but without the PDS. The LED will blink twice in succession, once per second, to indicate this mode. The maximum rate of fire will be capped to the ROF Cap set for the fire mode the marker is in, regardless of the ROF Cap switch setting. To re-enable the PDS, turn the marker off and back on again, without holding the trigger.

LED Flashing Patterns

Pattern	Status
⚡ ⚡	Normal operation, PDS enabled
⚡ ⚡ ⚡ ⚡	Normal operation, PDS manually bypassed
⚡ ⚡ ⚡ ⚡ ⚡ ⚡	PDS failed, reduced ROF in effect
⚡ ⚡ ⚡ ⚡	Normal operation, PDS recovered from failure

This table shows what each pattern of flashing means during normal operation of the marker.

Fire Modes

Rabid Code has 7 fire modes available, plus a Rate Of Fire Cap adjustable to within 0.1bps. The modes available are:

- **Semi Automatic** - One shot per pull.
- **Millennium '08** - Semi Auto up to 6bps for first 3 shots, then ramping up to 2 shots per pull. If the rate of fire drops below 6bps, ramping will stop and 3 more Semi Auto shots will be needed to restart ramping.
- **Millennium '05** - Semi Auto up to 7.7bps (no 3-shot semi), then ramping up to 2 shots per pull.
- **PSP ramp** - Semi Auto up to 5bps for first 3 shots, then ramping up to 3 shots per pull. If the trigger is not pulled for more than 1 second, ramping will stop and 3 more Semi Auto shots will be needed to restart ramping.
- **NXL** - Semi Auto for 3 shots, then Full Auto fire for as long as the trigger is held down. If the trigger is released for more than 1 second, then Full Auto will stop and 3 more Semi Auto shots will be needed to restart Full Auto.
- **Auto Response** - One shot per pull and one shot per release.
- **Dry Fire** - Semi Automatic, but without use of PDS and with no ROF Cap. This mode is for trigger training, and should never be used to shoot paint as ball breakage will occur (the loader may not keep up, or at high rates of fire the bolt may not fully cycle, trapping balls and chopping them.)

ROF Cap

The ROF Cap can be enabled using the DIP switch inside the right-hand side of the grip. When enabled, the marker will never shoot at a faster rate than the selected ROF. When the PDS is manually bypassed, the ROF Cap is always in effect regardless of the DIP switch setting. When the PDS has failed, the ROF is limited to 10bps. The ROF Cap never applies to Dry Fire Mode.

The ROF cap is controlled by DIP1. When DIP1 is off, there is no ROF Cap as long as the PDS is active and enabled. When DIP1 is on, the ROF is capped at all times to the selected value.

Presets

The board can be loaded with up to 4 preset fire mode and ROF Cap combinations. These presets can be quickly selected using the DIP switches inside the right-hand side of the grip. This allows settings to be loaded for several different tournament series, or fields, without having to enter Programming Mode each time a mode change is needed. In the factory configuration, the following modes are assigned to each preset:

- **Preset 1** (DIP2 on, DIP3 on): Semi Automatic, ROF Cap set to 15.4bps
- **Preset 2** (DIP2 on, DIP3 off): Millennium '08 Ramping, ROF Cap 12.0bps
- **Preset 3** (DIP2 off, DIP3 on): PSP Ramping, ROF Cap 13.3bps
- **Preset 4** (DIP2 off, DIP3 off): NXL Mode, ROF Cap 15.4bps

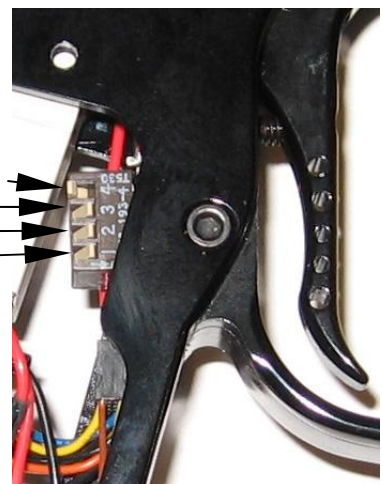
Remember that as long as the PDS is enabled and active, the ROF Cap will only be in effect if DIP1 is on. Other fire modes can be accessed by assigning them to one of the presets; see the "Programming" section below.

DIP Switches

The "on" position is towards the trigger.

- DIP4 – Programming Mode
- DIP3 – Preset Selection
- DIP2 – Preset Selection
- DIP1 – ROF Cap

See the table below for a description of the possible settings of each DIP switch:



Programming

DIP4 is used to access Programming mode, and also acts as a Tournament Lock. When DIP4 is off, the Tournament Lock is active and no settings can be modified (apart from manually bypassing the PDS.) When DIP4 is on, holding in the trigger while turning the marker on puts the marker into Programming Mode.

On entering Programming Mode, the LED will flicker. This indicates that the marker is waiting for a "menu" selection. Find the setting you wish to modify from the list below, and pull the trigger the corresponding number of times in quick succession:

- 1) **Fire Mode**
- 2) **ROF Cap**
- 3) **Dwell**
- 4) **Debounce**
- 5) **Eye Delay**
- 6) **Eye Forcing**

A short while after the last trigger pull, the LED will flash the value of the current setting. At this point, if you do not want to change the setting, wait until the LED blinks rapidly and you will be returned to the menu. If you do want to change this setting, tap the new value on the trigger, starting within 2 seconds of the last flash.

If the new setting is accepted, the LED will flicker briefly and then turn on solidly for a second. The new setting is saved and you are returned to the menu. You may carry on to verify or change other settings, or you can turn the marker off.

If there is a problem with the new setting, the LED will flash rapidly to indicate the error and you will be returned to the menu without the setting being altered. Check the value you are entering and make sure it is valid for the chosen setting.

The first two menu items, Fire Mode and ROF Cap, are specific to the current preset, as selected by DIP2 and DIP3 (see "Presets" above.) Make sure DIP2 and DIP3 are set to the correct preset before modifying these settings; changes to the Fire Mode and ROF cap in one preset will not affect any of the other presets. In Programming Mode, unlike in normal usage, DIP2 and DIP3 may be switched while the marker is switched on, to make changing multiple presets quicker. The remaining menu items are global and apply to all presets. For these settings, the currently selected preset is irrelevant.

A detailed description of the menu items, and their range of possible values, follows:

- 1) **Fire Mode (1-7)**
 - ⇒ This menu item sets, for the current preset only, the Fire Mode in effect. Possible settings are:
 - 1) Semi Automatic
 - 2) Millennium '08
 - 3) Millennium '05
 - 4) PSP ramp
 - 5) NXL
 - 6) Auto Response
 - 7) Dry Fire
 - ⇒ For a more detailed description of these modes, see "Fire Modes" above.
 - ⇒ For factory default settings, see "Presets" above.
- 2) **ROF Cap (8.0 - 24.9bps)**
 - ⇒ This menu item sets, for the current preset only, the ROF Cap used when DIP1 is on, or when the PDS is manually bypassed.
 - ⇒ As the internal oscillator of the Promaster circuit varies slightly in accuracy from one board to the next, the actual ROF obtained at a particular setting should be verified with a PACT timer or ballistic

chronograph. Red "radar" chronographs commonly used for velocity measurements can NOT be relied upon for accurate ROF readings.

- ⇒ The method of display and entry of this setting is a little different to the others, due to the extended range of possible values. When displaying the entry, the LED will flash first the whole BPS, then it will flicker briefly to indicate the decimal point, and finally it will flash the tenths of a BPS (if the value ends in .0 then it will not flash after the decimal point.) When entering a new value, tap first the whole BPS, then wait for the LED to flicker to acknowledge the value, then tap the tenths (if the value ends in .0 then do nothing after the flicker and wait for the setting to be saved.) If at any point you enter an invalid value (less than 8 or more than 24 for the "whole" BPS, or more than 9 for the "tenths") then the LED will flash to indicate the error and return you to the menu. When the new setting is saved, the LED will flicker, then go solid, as per normal.
- ⇒ If this is unclear, see the section "Programming Examples" below.
- ⇒ For factory default settings, see "Presets" above.

3) **Dwell** (1-20ms)

- ⇒ This menu item sets, for all presets, the time in milliseconds that the solenoid is held open when firing. If the dwell is too low, velocity will be low or inconsistent, and the marker may suffer "first shot dropoff" (FSDO). If the dwell is too high, gas efficiency will be poor.
- ⇒ The factory default setting is 8ms.

4) **Debounce** (1-50ms)

- ⇒ This menu item sets, for all presets, the trigger switch debounce value in milliseconds. This is the time that must pass after a trigger pull before another pull is registered. Setting this value too low may cause false shots (more than one shot per pull in Semi Automatic mode). Setting Debounce too high will make the trigger less responsive and reduce the effective maximum rate of fire. If the value has to be higher than 15-20ms to reduce trigger bounce, consider changing the mechanical setup of the trigger, by tightening the return spring screw, or moving the trigger stops and the switch point setting further away from each other.
- ⇒ The factory default setting is 5ms.

5) **Eye Delay** (1-20ms)

- ⇒ This menu item sets, for all presets, the time for while a ball which has dropped into the breach, must remain in front of the PDS eye before the marker is allowed to fire. This is to prevent ball breakage when paintballs "bounce" on entering the breach. With force fed loaders, this value can be kept low (1-4ms); gravity fed loaders may need a higher value (5-10ms) to ensure reliable operation without excessive ball breakage.
- ⇒ The factory default setting is 3ms.

6) **Eye Forcing** (1-off, 2-on)

- ⇒ This menu item sets, for all presets, whether Eye Forcing is enabled. This means that, when PDS is enabled and is preventing the marker for firing because no ball is detected, holding the trigger in for 1 second will force the marker to fire once. This can be useful when using a sound-activated loader, to make it feed the first ball into the marker.
- ⇒ The factory default setting is 2 (on).

Programming Examples

These examples assume you have set DIP4 to the Programming position (on) and that you have turned the marker on while holding the trigger in until the LED starts flickering.

- **Change dwell to 10ms**
 - ⇒ Pull the trigger 3 times
 - ⇒ The LED will flash 8 times to indicate the current setting is 8ms
 - ⇒ After the last flash, tap the trigger 10 times
 - ⇒ Wait until the LED flickers, then goes solid
 - ⇒ The setting is saved and you are returned to the menu
- **Change the Fire Mode of preset 3 to PSP Ramp**
 - ⇒ Set DIP2 on and DIP3 off
 - ⇒ Pull the trigger once
 - ⇒ The LED will flash 3 times to indicate the current setting
 - ⇒ After the last flash, tap the trigger 4 times (for PSP Ramp)
 - ⇒ Shortly after you finish, the LED will flicker then go solid
 - ⇒ The setting is saved
 - ⇒ The Fire Mode of other presets is not changed
- **Set the ROF Cap of preset 3 to 12.0bps**
 - ⇒ Set DIP2 on and DIP3 off
 - ⇒ Pull the trigger twice
 - ⇒ The LED will flash 13 times, then flicker briefly, then it will flash another 3 times. This indicates the current setting of 13.3bps
 - ⇒ After the last flash, tap the trigger 12 times (for 12bps)
 - ⇒ The LED will flicker briefly
 - ⇒ Wait (no tenths to add)
 - ⇒ The LED will flicker then go solid
 - ⇒ The setting is saved
 - ⇒ The ROF Cap of other presets is not changed
- **Set the ROF Cap of preset 3 back to 13.3bps**
 - ⇒ Set DIP2 on and DIP3 off
 - ⇒ Pull the trigger twice
 - ⇒ The LED will flash 12 times, then flicker briefly, but will not flash again after that (indicating 12.0bps)
 - ⇒ When the LED activity has stopped, tap the trigger 13 times
 - ⇒ The LED will then flicker briefly
 - ⇒ Now tap the trigger 3 times
 - ⇒ The LED will flicker then go solid
 - ⇒ The setting is saved at 13.3bps

Troubleshooting

- **I am getting low or erratic velocity, or first shot dropoff**
 - ⇒ Your dwell may be too low. The recommended value for a standard Promaster is around 8ms.
 - ⇒ Your battery may be low. Replace with a fresh, new battery.
 - ⇒ The HPR, LPR or cylinder may need cleaning, lubricating or repairing.
- **I am getting strange behaviour**
 - ⇒ Your battery is low. Replace with a fresh, new battery.
- **When I turn the marker on, the LED starts flashing or flickering and won't stop until I turn it off**
 - ⇒ The trigger is misadjusted, so the microswitch is constantly depressed. Adjust the switchpoint and/or trigger stops until the microswitch is pressed and released with each trigger pull.
- **The marker shoots slowly, no matter how high I set the ROF cap**
 - ⇒ The PDS may be damaged or contaminated with paint. Ensure the breach is clean and the PDS components on both sides are properly aligned. If the PDS cannot be repaired, bypass the PDS by holding the trigger in while turning the marker on.
- **When I try to bypass the PDS, the LED flickers at me and the gun does not fire**
 - ⇒ DIP4 is set to Programming mode (on). Whenever you are not adjusting the settings, DIP4 should be left in the Tournament Lock position (off).
- **I have the ROF Cap disabled (DIP1 is off) but the marker won't dry fire quickly, even if I bypass the PDS**
 - ⇒ Remember that when the PDS is bypassed, the ROF Cap applies regardless of the setting of DIP1. This is because, in normal operation, the PDS is used to monitor the position of the bolt for highest cycling speed. Without this feedback, a capped rate of fire is the only way to ensure that the marker has cycled fully. The only mode where the ROF cap is never used is Dry Fire mode. But don't use Dry Fire mode to shoot paint!
- **In programming mode, after showing me the current setting, the LED flashes rapidly and returns me to the menu**
 - ⇒ You have about 2 seconds after the last flash to start entering a new value. If you have trouble catching this 2-second gap, then don't worry about trying to enter the new value the first time you choose the setting -- just count the flashes for the current setting, then next time you go to that setting you will know how many flashes to expect before you need to start entering the new value.