Pro24® Reloadable Rocket Motor System

Age Requirements

Canada

Motors up to 80 N·s Total Impulse: May be sold to users age 12 and above.
Motors up to 160 N·s Total Impulse: May be sold to users 18 years of age and over.
Motors above 160 N·s Total Impulse: May be sold to certified High Power Rocketry users, 18 years of age and older.

USA

Motors up to 160 N·s Total Impulse and below 80 N Average Thrust:
May be sold to users 18 years of age and over.
Motors above 160 N·s Total Impulse or 80 N Average Thrust :
May be sold to certified High Power Rocketry users, 18 years of age and older.

WARNING **Fire or Projection Hazard**

Precautions Keep away from heat/sparks/open flames/hot surfaces. No smoking
Use within 1 year of manufacture

WARNING FOR ALL *Pro24*® *SKIDMARK*™ RELOAD KITS

SKIDMARK™ motors can produce a risk of FIRE. The user MUST adhere to the NFPA/NAR/Tripoli/CAR Safety Codes. The user MUST have a minimum 70' diameter cleared of all combustible materials, or dry grass. Sparks are emitted and can cause fire if not properly flown. Water or fire equipment should be on hand. The user assumes all risks.

System Overview

Pro24® High-Power Reloadable Rocket Motors are professionally engineered propulsion systems designed for safe use, high performance, ease of assembly and high reliability. The ***Pro24***® system also features a unique *user-adjustable* time delay. Reloading is a quick, easy, 3-step operation. Select and adjust the time delay, motor assembly and igniter installation.

You will see that we've added a number to the front of the standard motor type code system. This number indicates the total impulse of the motor in Newton-seconds. For example, 200H300-15A is an 200N·s "H" motor, with 300N average thrust and a 15s *adjustable* delay. Please study Figure 1 for an overview and nomenclature of the ***Pro24***® motor system.

Storage

Store in accordance with local/regional/national regulations.
Storage location should be clean, dry and away from potential sources of heat or ignition.
Maintain the reload kit between -5°C and 30°C (23°F to 86°F) for storage and use.

Assembly and Operating Instructions

WARNING
Comply with all Federal, State/Provincial and local laws in all activities with high-power rockets. Read and follow the Safety Codes of the Tripoli Rocketry Association (TRA), National Association of Rocketry (NAR) and Canadian Association of Rocketry (CAR).

Step 1 – Time Delay Adjustment

Each motor is equipped with a full-length delay grain which provides the delay time shown in the motor designation. This delay may be *reduced* by 3,5,7, or 9 seconds as required down to the minimum delay time allowed for the motor type. Refer to the following table to select the proper adjustment for your application.

Do not adjust the delay time to less than 4 seconds!

Delay designation in motor type code:	Delay adjustment and resulting delay time:				
	None	**-3**	**-5**	**-7**	**-9**
-7A	7s	4s	Do not use	Do not use	Do not use
-8A	8s	5s	Do not use	Do not use	Do not use
-9A	9s	6s	4s	Do not use	Do not use
-10A	10s	7s	5s	Do not use	Do not use
-11A	11s	8s	6s	4s	Do not use
-12A	12s	9s	7s	5s	Do not use
-13A	13s	10s	8s	6s	4s

CAUTION
Work in a tidy area, away from other rocket motors and materials, well away from any open flame or heat source.
Perform delay adjustments in the field during rocket preparation.
Delay adjustments are irreversible, and are safer if done outside.

NOTE: The ejection charge on all ***Pro24***® motors is 0.6g of FFFFG black powder. If additional ejection charge is required, do not remove white cap. Instead, add additional powder on top of white cap and seal the cavity with tape.

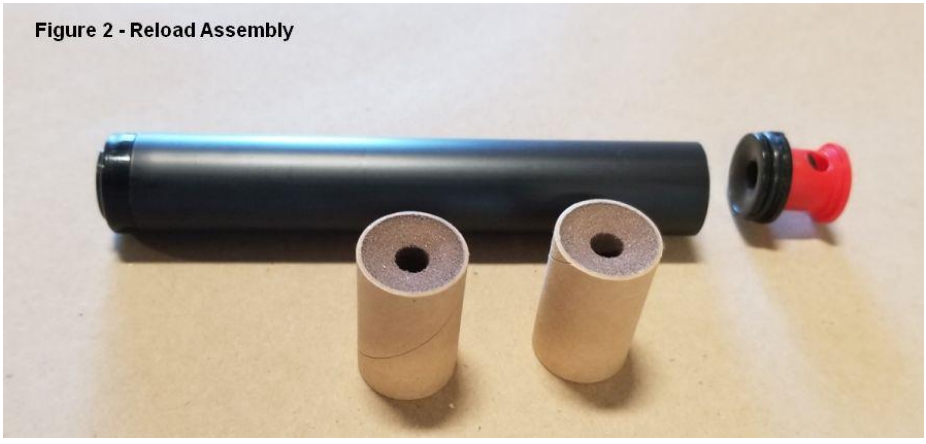
- Remove the delay/ejection module (Figure 1) from the reload kit liner. Return the reload kit to the package and store safely away during the delay adjustment operation. Check the drill guide and drill holder for debris and clean if required before proceeding. **Only use the *Pro38*® drill guide (*Pro-DAT*) in combination with the Pro24® centering ring. DO NOT** attempt to use without the centering ring, as the delay may not be drilled correctly.
- Select the delay adjustment desired, rotate the drill holder to the appropriate notch in the drill guide and seat the drill holder tab into the drill guide notch.
- Drop the Pro24® centering ring into the drill guide cavity.
- Holding the drill guide and drill holder together in one hand, insert the delay module into the drill guide cavity with insert until the drill bit touches the delay material. Rotate the drill holder clockwise while applying light pressure. Drill into the delay material until the drill guide bottoms out against the delay material. Rotate the drill for several more revolutions in order to clear the delay material from the hole.
- Remove the delay module from the guide. Empty any residue from the module.
- For safety, we recommend that you dispose of the delay residue by soaking it in water for a minimum of 1 hour then discarding the residue. A small zip-lock bag or plastic container filled with water is ideal and will safely dissolve the oxidizer from the delay material. This aqueous solution is not harmful to septic or sewage systems.

NOTE: If using an electronic recovery system, remove the white plastic disc from the end of the delay/ejection module and transfer the powder to your remote ejection charge holder and follow the recovery system instructions. Reinstall the module into the reload assembly.

Step 2 – Motor Assembly

- Inspect the motor casing for damage. Discard if damaged. Modification of the casing can cause property damage or result in serious personal injury.
- Using a gentle twisting motion, insert the delay/ejection module into the forward end of the plastic liner as far as it will go. A small gap between the forward end of the liner and the shoulder on the delay/ejection module as shown is normal.

Figure 2 - Reload Assembly



Step 3 – Igniter Installation

NFPA 1127 – Code for High Power Rocketry, 2018 edition, states the following:

"4-13.5 An ignition device shall be installed in a high power rocket motor only at the launcher or within the prepping area.
4-13.6 A high power rocket shall be pointed away from the spectator area and other groups of people during and after installation of the ignition device."

These rules must be followed when **removing** or **installing** igniters for **ANY** reason.

WARNING

Never store rocket motors with igniters installed. Do not install igniters until the rocket motor is installed in the rocket vehicle and the rocket vehicle is completely prepared and ready for launch. If weather, safety or other conditions result in a delay of the launch, disconnect all igniters from the launch system and replace the shunts. If the launch is aborted for any reasons, remove the igniters from the motors and install the shunts.

WARNING

Twist the bare igniter leads together several times **BEFORE** proceeding with igniter installation. **NEVER** check continuity of an electric igniter after it has been installed in a rocket motor unless done remotely from launch control while all personnel are in the safe location for rocket launch.

Figure 3 - Igniter Installation

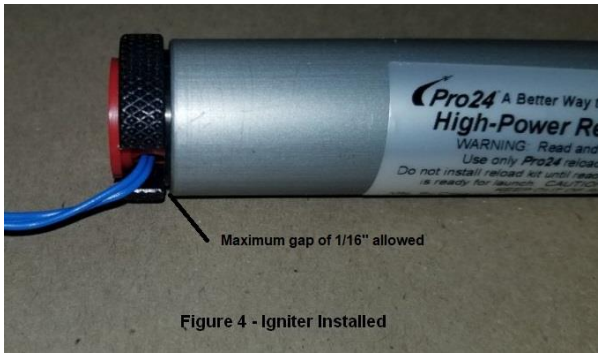


Figure 4 - Igniter Installed

Igniter specifications*:

Bridge wire resistance: 0.8 – 1.2 Ω
Recommended nominal firing current: 1.25 A
Maximum no-fire current: 0.4A
Maximum test current: 0.04A

(*) These are manufacturer's specs. CTI assumes no responsibility for their use or misinterpretation.

- Carefully uncoil the igniter leads. Remove any kinks or twists and straighten the wires for about 24" (60 cm) from the igniter head. Remove the nozzle cap from the motor and feed the shunted ends of the igniter leads through the inside of the nozzle cap and out through the hole.
- Insert the igniter head into the nozzle and push until it stops against the igniter pellet. With the igniter in this position, bend a loop into the igniter leads one cap length from the nozzle exit (Figure 3 – igniter shown outside motor for indication of approximate location of the igniter pellet).

- Slide the nozzle cap up to the loop made in the previous step and firmly push the nozzle cap over the nozzle and loop previously made to retain the igniter (Figure 4).
- Remove the shunt and separate the wire leads **ONLY** while the rocket is installed on the pad and the launch control system is rendered safe (i.e. disarmed and shunted where applicable).

Important notes:

- Only use the igniter provided with the reload kit. Do not interchange with other ***Pro24***® igniters or with any other type of igniter.

Step 4 – Post Firing

CAUTION

Your ***Pro24***® rocket motor may be hot after firing. Allow the motor to cool COMPLETELY before proceeding.

- Unscrew the reload kit from the motor casing and discard - there are no reusable parts in the reload kit. If the delay module remains in the motor casing after removal of the reload assembly, push it out through the forward end of the motor case with a wooden or plastic tool. Be careful not to dent or scratch the motor casing in any way. The use of metal tools is **NOT** recommended.
- Ordinarily, the motor casing will not require any post-flight cleanup. In the event that any combustion residue remains, the casing should be cleaned as soon as possible with hot soapy water and a non-abrasive cloth. When not in use, store the motor casing in its original package for protection. Care must be taken not to dent the motor casing or damage the internal threads.

Disposal

Remove forward closure and remove propellant grains from plastic liner. Discard plastic liner and nozzle assembly. Place forward closure and grains in a shallow hole in the ground, away from any combustibles, install igniter in forward grain in contact with the igniter pellet, secure with tape if necessary. Ignite electrically from distance of 10 meters (min). Wait until flames cease. Remnants may be disposed of with household garbage.

First Aid

If ingested, induce vomiting. Burns from flames are to be treated as regular burns with normal first aid procedures. In either case, seek medical attention. See Safety Data Sheet for more detailed information.

Warranty

Cesaroni Technology Incorporated ("**CTI**") certifies that it has exercised reasonable care in the design and manufacture of its products. We do not assume any responsibility for product storage, transportation or usage. **CTI** shall not be held responsible for any personal injury or property damage resulting from the improper handling, storage or use of their products. The buyer assumes all risks and liabilities and accepts and uses **CTI** products on these conditions. No warranty either expressed or implied is made regarding ***Pro24***® products, except for replacement or repair, at **CTI's** option, of those products which are proven to be defective in manufacture within one (1) year from the date of original purchase. For repair or replacement under this warranty, please contact your point of purchase. Proof of purchase will be required. Your province or state may provide additional rights not covered by this warranty.

⇒ Check out our web site at **http://www.pro38.com/** for tech tips, FAQ's, and photos

⇒ For technical and warranty inquiries, please contact your ***Pro24***® dealer.