

**Caution! Motor is hot after firing! Allow motor to cool before handling.**

**FOR YOUR SAFETY ALWAYS WEAR EYE PROTECTION After Firing Cleanup**

When the motor has cooled, remove both retaining rings and the nozzle washer (wear eye protection).

Remove the bulkhead from the motor case and discard the primary O-ring and the delay O-rings. Using a wood dowel, push the nozzle end and liner tube out of the head end of the case.

Remove the nozzle O-ring and discard the liner and all of the O-rings in a proper receptacle. Clean all motor parts with soap and water except nozzle.

Before firing again, remove large deposits of slag from the nozzle face with a razor blade and jeweler's screw driver. Small slag deposits can be ignored, but the nozzle throat hole must be clear. Slag often loosens on its own over several days. Please see [www.lokiresearch.com](http://www.lokiresearch.com) for more information on nozzle maintenance and best practice.

Compare the two retaining rings and if their shape differs, replace both with new parts. Inspect the nozzle washer to ensure it is flat and not bent or warped.

**Disposal**

In the unlikely event that a Loki Research reload kit needs to be disposed of due to damage or defects, it should be returned to Loki Research. Please contact Loki Research prior to shipment for instructions in this regard.

**Safety & First Aid**

Keep all reload kits away from sources of heat and flames and out of reach of children. When ignited, Loki Research propellant will burn slowly and will not explode. In case of accidental ignition, fight any fires with water. Foam and carbon dioxide are not effective against propellant fires. In the case of minor burns, apply first aid techniques and consult a physician. For more serious burns: immerse in cold water and seek immediate medical attention. Do not eat any part of a reload kit. In case of accidental ingestion, induce vomiting and call a physician immediately. Propellant consists mainly of ammonium perchlorate dispersed in a polyurethane synthetic rubber.

**Disclaimer**

Loki Research states that it has taken reasonable care in the design and manufacture of its products. However, as we cannot control the storage and use of our products, Loki Research cannot be held responsible for any personal injury or property damage resulting from storage, handling, or use of its products. Purchasers of Loki Research products hereby acknowledge this, and will hold Loki Research, LLC, its owners, employees, and subcontractors, blameless and harmless for any and all actions of the purchaser and user.

**Limited Warranty**

**What does this warranty cover?** We warrant each reload to be free from defects in material and workmanship. Our obligation under this warranty is limited to replacement or repair, at our discretion, of the reload and/or the Loki Research motor hardware only. Proof of purchase required.

**How long does the warranty last?** This warranty runs for one year from the date of original purchase.

**What does the warranty not cover?** This warranty does not cover defects or damage to airframes, vehicles, or other devices in which a rocket motor may be used, or to any support equipment they may require. This warranty does not cover defects or damage which result from abuse, misuse, negligence, or accidents. Also, consequential and incidental damages resulting from the use of this product or arising out of any breach of contract or breach of this warranty are not recoverable under this warranty. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above may not apply to you.

**BORN ON:**

Loki Research, LLC  
8 Karen Dr  
Eldon, MO 65026  
[www.lokiresearch.com](http://www.lokiresearch.com)

**Made in USA**

rev C-5/08/2013

# LOKI RESEARCH ROCKET MOTORS

High Power Reload Kit

This package contains one reload kit for use with Loki Research 76mm rocket motors or equivalent\*

\*see [www.lokiresearch.com](http://www.lokiresearch.com) Tech Page for hardware specifications

## L-780 M-1200

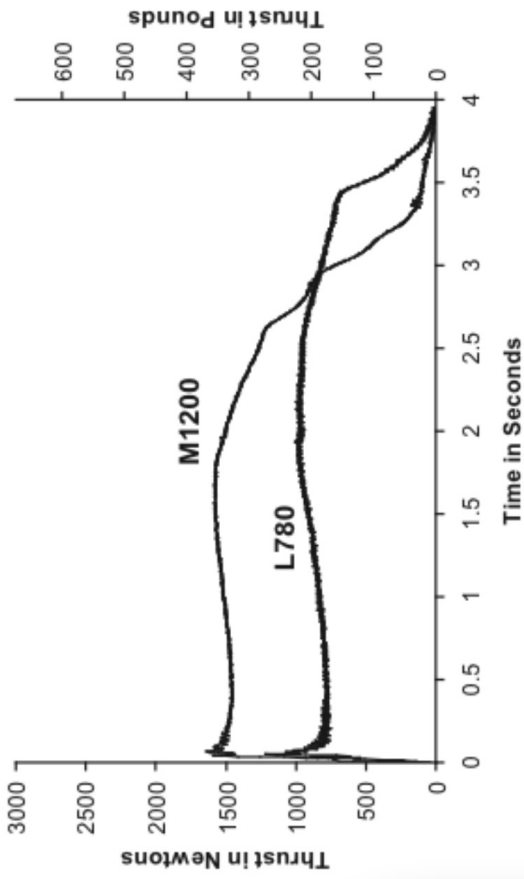
**Loki Spitfire Propellant: Sparks, noise and black smoke**

**WARNING-FLAMMABLE**

Keep out of reach of children. Do not use near open flame. Not for sale to persons under 21 years of age. For use by certified High-Power users only. Do not open until ready for use.

Nozzle Size	Case Length	Total Impulses	Loaded Motor Weight	Propellant Weight	Delay Times (Seconds)
L-780 #40 0.625"	19 5/8"	3000 N-sec	4.200 kg	1.878 kg	XS 3 M L XL
M-1200 #52 0.813"	30 7/8"	5200 N-sec	5.530 kg	3.130 kg	Smoke Only

**Important!** The correct nozzle must be used or motor failure may occur! Check the number engraved on the nozzle against this table



# Motor Assembly Instructions – For your safety always wear eye protection!

**If using a forward bulkhead manufactured & sold from Loki Research before 1/1/14 please refer to the Bulkhead Addendum at the bottom before proceeding. For bulkheads manufactured and sold after 1/1/14, use the instructions below. These will be threaded on the outside and have a small hole passing through the center of the smoke well.**

1. Check that all hardware pieces are clean and free of grease and soot. In particular, check and clean both retaining ring grooves and the delay cavity in the bulkhead. Run your finger around the inside ends of the motor case. Feel for any nicks or sharp raised metal that may cut or tear the o-rings. If found, remove them with a sharp knife or small file prior to motor assembly.
2. Rub a thin layer of grease on the inside of the bulkhead, each end of the case and over all o-rings. Temporarily place the o-rings on a clean surface.
3. Place the small 1.25" OD by 3/32" thick o-ring onto the tracking smoke grain. Apply a light film of grease to the back side of the smoke grain.
4. Loosen the head bolt at the top end of the bulkhead. Push the smoke grain into the smoke well, being careful as the o-ring is compressed into the well. Push the grain all the way in and then tighten the head bolt down. An eye bolt may be used on the bulkhead in place of the head bolt. Transfer the small o-ring from the head bolt to the eye bolt and tighten with a jam nut.
5. Install small snap ring in the smoke well to retain the smoke element.
6. Install all o-rings, the larger black 1/8" thick o-rings onto the bulkhead, the smaller 3/32" o-ring onto the bulkhead shoulder, and the orange 1/8" thick o-ring(s) onto the nozzle.
7. Check the motor liner to make sure one end is sanded and the inside corners are chamfered smooth. Lightly grease this inside end of the liner. This will be the head end of the motor liner. **If the grains of this reload require bonding to the liner, you will find those instructions included herein. Please refer to them at this time.** Slide each propellant grain into the motor liner. If the grains are numbered, the 1<sup>st</sup> grain goes to the head end of the motor, then the 2<sup>nd</sup> grain and so on. The highest numbered grain goes at the nozzle end.
8. Insert the recessed shoulder of the nozzle into the nozzle end of the liner tube and slide together (liner tube first) into the thrust ring end of the motor case (see diagram below). **Be sure to use the correct size nozzle (see table on front page).**
9. Place the stainless steel nozzle washer behind the nozzle and install the retaining ring using appropriate retaining ring pliers.
10. Install the assembled bulkhead into the top of the motor and carefully push it in until the bulkhead shoulder o-ring is seated into the end of the liner. Secure with the second retaining ring. If there is a gap between the bulkhead and retaining ring, pull the bulkhead up flush against the retaining ring. There will be a small amount of empty space in the case and the grains may rattle. This is normal.
11. Make a final physical inspection to ensure that both retaining rings are fully seated in their grooves. The motor can now be installed in the rocket. Use positive mechanical means to prevent the motor from being ejected during flight.
12. Install an electrical igniter only when at the launch pad or in a safe area designated by the range safety officer. Slide the igniter through the nozzle all the way up until it touches the smoke element. Secure in place with tape or use other means to prevent the igniter from sliding down.
13. Fire from a safe distance in accordance with NFPA code 1127 and the rules of your launch site.

**CAUTION! Motor will be hot after firing! Allow to cool before handling.**

## Bulkhead Addendum

Instructions for bulkheads sold before 1/1/14 which have a retaining ring in the smoke well but no hole through the top of the bulkhead. Proceed with the instructions above, but omit the o-rings on the tracking smoke grain and the liner shoulder.

"Original" style Loki Research bulkheads with no retaining ring in the smoke well will also omit these same two o-rings, and it must have the smoke grain potted with RTV silicone and given sufficient time for the silicone to cure. Do not grease any part of the tracking smoke grain or inside of the smoke well. Place a dime sized dab of RTV silicone on the back of the smoke grain, insert the grain into the smoke well and push in firmly while twisting the grain back and forth. Let sit until the silicone has fully cured before firing. It is recommended that the bulkhead be sent back to Loki Research to be re-machined at no cost to the customer with the exception of shipping charges. The shipping address can be found on the back of this instruction sheet. Please include your phone number, return address and simply state the reason for the return.

### Parts List

Motor Hardware:  
 Motor Case with thrust ring 1  
 Forward Bulkhead 1  
 Graphite Nozzle 1  
 Nozzle Washer 1  
 Retaining / Snap Rings 2 large (motor case), 1 small (bulkhead)

Reload Kit:  
 Liner Tube (black phenolic) 1  
 Propellant Grains 3 to 5  
 Primary O-Rings (1/8" thick) 3 to 4  
 Tracking smoke O-Ring (3/32" thick x 1.25" OD) 1  
 Liner shoulder O-Ring (3/32" thick x 2.625" OD) 1  
 Tracking Smoke Element 1

Required, but not supplied:  
 Internal retaining ring pliers\*  
 O-Ring lubricant\*\*  
 Electric Motor Igniter  
 Protective Eyewear

\* We recommend "Knipex" brand retaining ring pliers. These may be purchased from [www.mcmaster.com](http://www.mcmaster.com), use part #5449A93. \*\* Use petroleum jelly, synthetic automotive grease, silicone based greases

Figure 1

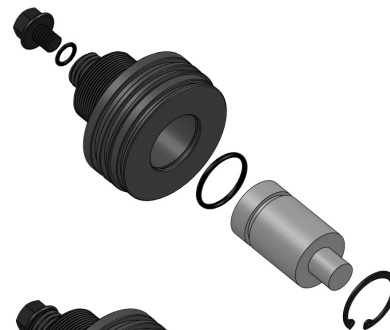


Figure 2

