

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, it's 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.

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BORN ON:

Made in USA  
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# LOKI RESEARCH ROCKET MOTORS

## HIGH POWER RELOAD KIT

This package contains one reload kit for use with Loki Research  
38mm rocket motors or equivalent\*

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

### HP G-69 H-100 I-316 J-396

Delay time is adjustable from 5 to 17 seconds

Loki Spitfire Propellant: sparks, noise and black smoke

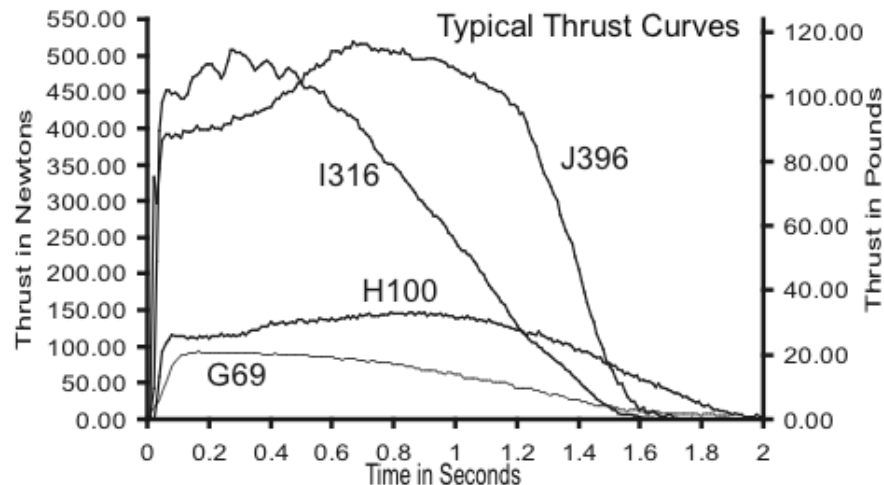
### WARNING-FLAMMABLE

Keep out of reach of children. Do not use near open flame. Not for sale to persons under 18 years of age. For use by certified High-Power users only.

Do not open until ready for use.

	Nozzle Size	Case Length	Total Impulse	Loaded Motor Weight	Propellant Weight	Delay Times (Seconds) XS S M L XL
G-69	#10 0.156"	4.81"	105 N-sec	275 g	63 g	5, 8, 10, 13, 17
H-100	#16 0.250"	7"	200 N-sec	335 g	120 g	5, 8, 10, 13, 17
I-316	#19 0.297"	11.5"	465 N-sec	540 g	240 g	5, 8, 10, 13, 17
J-396	#22 0.344"	16"	650 N-sec	752 g	372 g	5, 8, 10, 13, 17

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



## Before you begin:

Read the instructions completely and study the diagrams. Use the reload kit only in accordance with all instructions. Review the parts list and if any parts are missing or damaged, contact your Loki Research dealer for replacements. Note that in some reloads the liner tube is packaged separately from the other parts.

### Parts List

#### Motor Hardware

Motor Case with thrust ring	1
Graphite Nozzle	1
Forward Washer	1
Retaining / Snap Rings	2

#### Reload Kit

Liner Tube (brown kraft-phenolic)	1
Propellant Grains	G=2, H=4, I=8, J=6
Primary O-Rings (1/8" thick)	2
Delay O-Rings (3/32" thick)	6
Delay Element	1
Red Cap containing Black Powder	1

### Required, but not supplied:

Internal retaining ring pliers\*  
 Loki Research Delay Adjustment Tool (Loki-DAT)  
 O-Ring lubricant\*\*  
 Electric Motor Igniter  
 Protective Eyewear

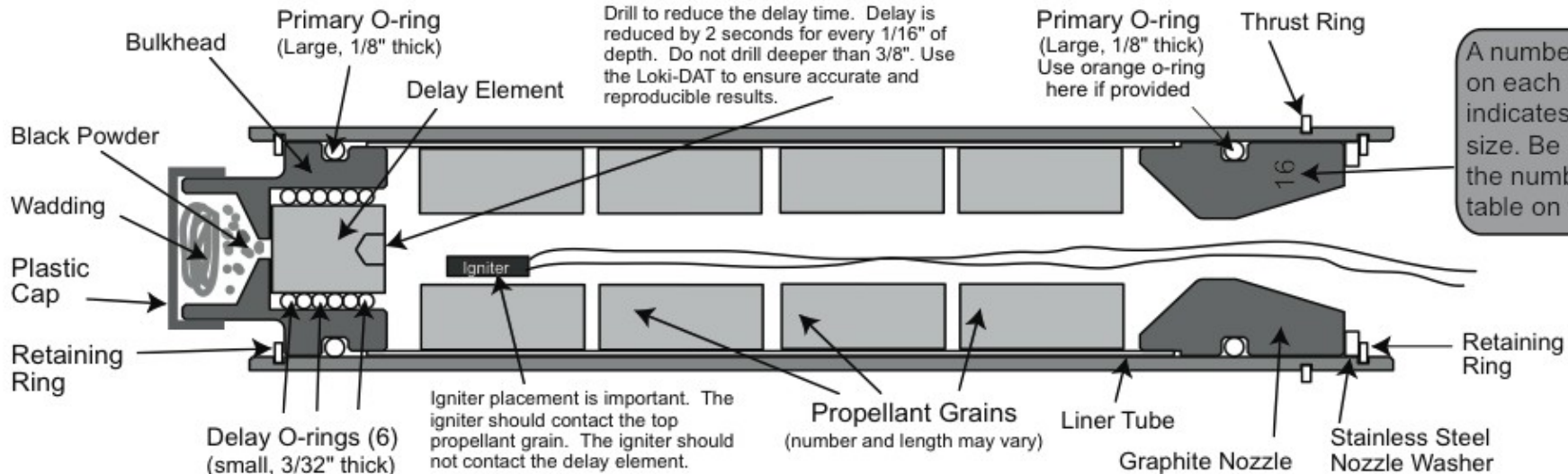
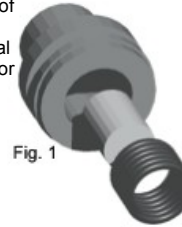
\* We recommend "Knipex" brand retaining ring pliers. These may be purchased from [www.mcmaster.com](http://www.mcmaster.com), use part #5449A92.

\*\* Use petroleum jelly, synthetic automotive grease, silicone based greases

## Assembly Instructions

### FOR YOUR SAFETY ALWAYS WEAR EYE PROTECTION

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. Next, rub a *very* thin layer of grease on the inside of the bulkhead and each end of the case.
2. 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.
3. Rub a light coat of grease on the six delay o-rings (small, 3/32" thick) and place them on a flat surface. With a clean hand, push the delay down into each o-ring one at a time. Avoid getting grease on the ends of the delay element (Figs 1 & 2).
4. Place the delay element stack on end, on a flat surface. Place the bulkhead over the stack and press down until the end of the delay element is flush with the bulkhead (Fig 3).
5. If desired, use the delay adjustment tool (Loki-DAT) to reduce the delay time.
6. Coat the primary O-rings (large, 1/8" thick) with grease. Install one Primary O-ring onto the bulkhead O-ring groove and one Primary O-ring onto the nozzle O-ring groove. If an orange Silicone o-ring is provided, it is to be used on the nozzle.
7. Push the recessed shoulder of the nozzle into 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).**
8. Place the stainless steel nozzle washer against the nozzle and install the retaining ring using appropriate retaining ring pliers. Always wear eye protection.
9. Stand the motor upright on the nozzle end and drop the propellant grains into the liner tube.
10. Install the assembled bulkhead into the top of the motor and secure with the second retaining ring. (see diagram below). 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. Fill the ejection well with the desired amount of black powder (or leave empty for no ejection). **Place some wadding on top of the black powder to hold it against the touch hole before installing the red plastic cap over the ejection well (see diagram below).**
12. 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.
13. 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 delay element. **Then pull it back 1/2 inch.** Secure in place with tape or use other means to prevent the igniter from sliding down.
14. 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.**



A number is engraved on each nozzle that indicates the throat size. Be sure to use the number listed in the table on the front page.