

# HIGH-POWER RMS™ Assembly and Operation Instructions

## READ THIS BEFORE YOU BEGIN:

- Study the illustrations and sequence of assembly. **THE SEQUENCE OF ASSEMBLY IS EXTREMELY IMPORTANT. READ ALL INSTRUCTIONS BEFORE USE. USE RMS™ MOTORS AND RELOAD KITS ONLY IN ACCORDANCE WITH ALL INSTRUCTIONS.** Review the parts list and become familiar with all parts before assembly. **IF ANY PARTS ARE MISSING OR DAMAGED, CONTACT RCS AT 1-435-865-7100 or email at warranty@aerotech-rocketry.com.**
- **DO NOT USE ANY PARTS OF THE RMS™ SYSTEM THAT ARE DAMAGED IN ANY WAY.** If in doubt, contact RCS at the number above for assistance.
- **DO NOT MODIFY THE MOTOR IN ANY WAY.** Modification of the motor or the reload kit parts could result in motor failure, lead to the destruction of both your rocket and motor and may cause personal injury, death and/or property damage. Modification of the motor or reload kit in any way will invalidate your motor warranty.
- **USE ONLY AEROTECH/RCS RMS™ RELOAD KITS AND MOTOR PARTS TO REFURBISH YOUR RMS™ MOTOR.** The AeroTech/RCS reload kits have been designed specifically for use in your particular AeroTech/RCS RMS™ motor. Use of imitation components may destroy your motor, rocket and payload and will invalidate your motor warranty. Only use AeroTech/RCS RMS™ reload kits intended for your specific AeroTech/RCS RMS™ motor. **DO NOT INTERCHANGE PARTS!** Do not use AeroTech/RCS RMS™ reload kits or motor components for any other purpose than to refurbish an AeroTech/RCS RMS™ motor.
- **DO NOT REUSE ANY OF THE DISPOSABLE PARTS OF THE RMS™ RELOAD KIT.** This includes the liner, nozzle and o-rings. These components have been designed for one use only and must be discarded after firing. Reuse can result in motor failure during subsequent operation and will invalidate your motor warranty.
- Motors are hot after firing. Although the RMS™ operates at a lower temperature than most disposable motors, the higher thermal conductivity of the aluminum motor parts may make it seem otherwise. If necessary to handle a motor before it has cooled down, use a rag or similar article.
- Read and follow the safety code of the Tripoli Rocketry Association (TRA) and comply with all federal, state and local laws in all activities involving high power rockets.

**DO NOT OPEN RELOAD KIT UNTIL READY TO USE.**

## PARTS:

### RMS™-98 HARDWARE

98mm enlarged aft closure	1
98/10240 case	1
98mm plugged forward closure	1

### RELOAD KIT

Nozzle (black plastic part)	1
Liner (3-5/8" O.D. black plastic tube)	1
Aft propellant grain (1-1/8" dia. chamfered "moon" core)	1
Forward propellant grains (1-1/8" dia. "moon" core)	3
Fwd & aft o-rings (3/16" thick X 3-5/8" O.D.)	2
Smoke charge grain (2.0" long short solid part)	1
Smoke charge insulator (1-1/2" O.D. tube)	1
Forward seal disk (3-5/8" O.D. phenolic disk)	1
Forward seal disk o-ring (3/32" thick X 3-3/8" O.D.)	1
Grain spacer o-ring (3/16" thick X 3-3/8" O.D.)	1

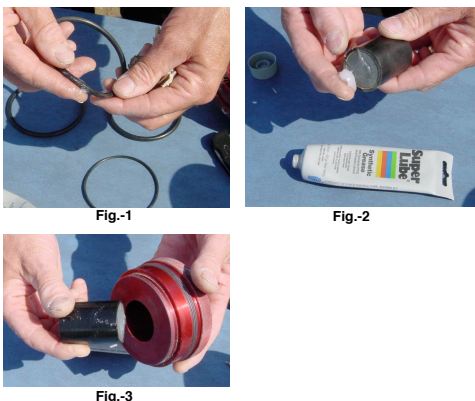
## ITEMS NEEDED FOR USE:

- 15 or 30-minute epoxy resin
- Synco™ Super Lube™ or other grease
- 3/4" - 1" diameter wooden dowel
- Electric match w/thermalite, Firestar™ or other igniter
- Masking tape
- Wet wipes or damp paper towels

**SAVE THE RELOAD KIT PLASTIC BAG AND GRAIN BOXES FOR THE USED RELOAD PARTS. DISPOSE OF BAG, BOXES AND PARTS PROPERLY.**

## Chapter 1. Forward Closure Assembly

- 1-1. **Fig-1:** Apply a light coat of Synco™ Super Lube™ or other grease to all threads, sealing surfaces and o-rings. This will facilitate assembly and prevents the threads from seizing.
- 1-2. **Fig-2:** Insert the smoke charge element into the smoke charge insulator until it is flush with both ends of the insulator.
- 1-3. **Fig-2:** Apply a liberal amount of grease to one end of the smoke charge element and the outside of the smoke charge insulator.
- 1-4. **Fig-3:** Insert the **greased** end of the smoke charge assembly into the smoke charge cavity of the forward closure until it is seated against the forward end of the cavity. Set the completed forward closure assembly aside.



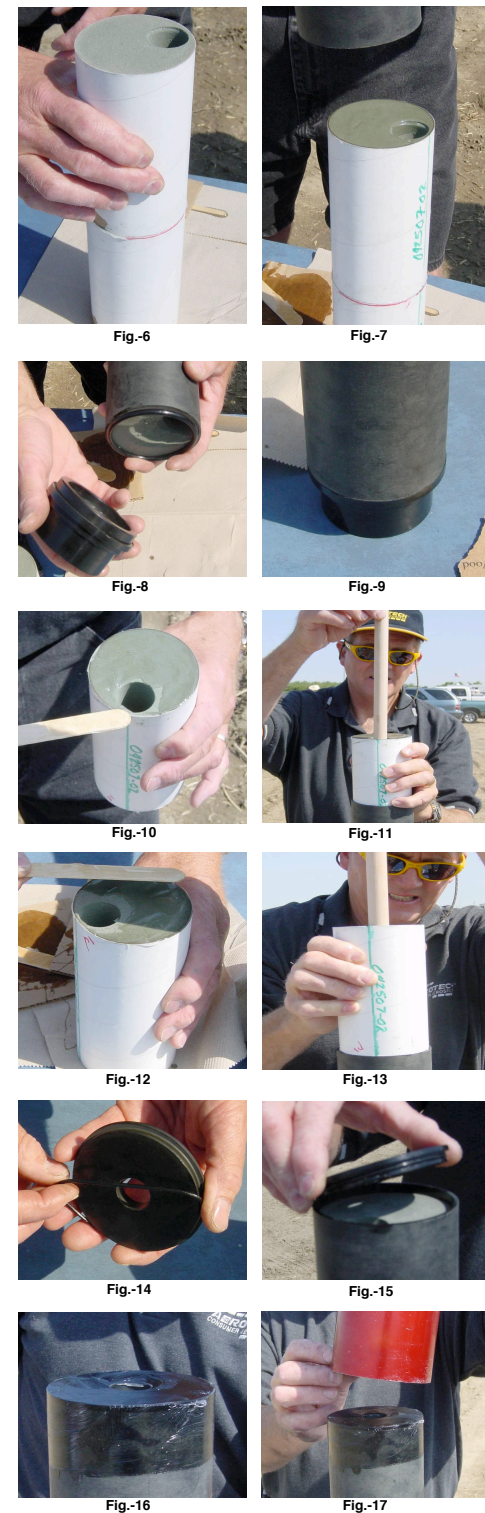
## Chapter 2. Liner & Case Assembly

- 2-1. **Fig-4:** Dispense approximately 20 grams of 15 or 30 minute epoxy and mix thoroughly.
- 2-2. **Fig-5:** Apply epoxy to one end of the 1<sup>st</sup> (aft chamfered) & 2<sup>nd</sup> grains. **NOTE:** The chamfered end of the 1<sup>st</sup> grain faces the nozzle and is **not** coated with epoxy.



## Chapter 2. Liner & Case Assembly (Cont'd)

- 2-3. **Fig-6:** Stack the 1<sup>st</sup> & 2<sup>nd</sup> grains together with the epoxied ends facing each other and the cores in visual alignment. **NOTE:** The chamfered end of the aft (1<sup>st</sup>) grain should be facing the table surface.
- 2-4. **Fig-7:** Mix and apply epoxy to the top surface of the 2<sup>nd</sup> grain, then slide the liner over the two epoxied grains.
- 2-5. **Fig-8:** Install the nozzle and grain spacer (3/16" thick X 3-3/8" O.D. o-ring) into the aft (chamfered grain) end of the liner.
- 2-6. **Fig-9:** Stand the liner assembly on the nozzle. Ensure that the nozzle flange is seated against the end of the liner.
- 2-7. **Fig-10:** Mix and apply epoxy to **both** ends of the 3<sup>rd</sup> grain.
- 2-8. **Fig-11:** Drop the 3<sup>rd</sup> grain into the liner until seated against against the 2<sup>nd</sup> grain with their cores in visual alignment, then insert a wood dowel into the core and wiggle around to align the cores.
- 2-9. **Fig-12:** Mix and apply epoxy to **one** end of the 4<sup>th</sup> grain.
- 2-10. **Fig-13:** Drop the 4<sup>th</sup> grain into the liner, **epoxy-coated end first**, until it is seated against against the 3<sup>rd</sup> grain with their cores in visual alignment, then insert the wood dowel into the core and wiggle around to align the cores.
- 2-11. **Fig-14:** Place the greased forward seal disk o-ring (3/32" thick X 3-3/8" O.D.) into the groove in the forward seal disk.
- 2-12. **Fig-15:** Install the reduced diameter (o-ring) end of the seal disk assembly into the open end of the liner until seated and flush.
- 2-13. **Fig-16:** Apply a liberal amount of grease to the upper 2" - 3" of the liner and the top surface of the forward seal disk.
- 2-14. **Fig-17:** Slide the motor casing over the liner.



## Chapter 2. Liner & Case Assembly (Cont'd)

- 2-15. **Fig.-18:** Place the greased forward (3/16" thick X 3-5/8" O.D.) o-ring into the forward (bulkhead) end of the case until it is seated against the forward seal disk.
- 2-16. **Fig.-19:** Thread the forward closure assembly into the forward end of the motor case by hand until it is seated against the case.
- 2-17. **Fig.-20:** Place the motor assembly in a horizontal position. Place the greased aft (3/16" thick X 3-5/8" O.D.) o-ring into the groove around the nozzle.
- 2-18. **Fig.-21:** Thread the aft closure into the aft end of the motor case by hand until it is seated against the case. **NOTE:** There will be considerable resistance to threading in the closure during the last 1/8" to 3/16" of travel. It is normal if a slight (1/16" to 3/32") gap remains between the closure and the case after tightening.



Fig.-18



Fig.-19



Fig.-20



Fig.-21

## Chapter 3. Preparation For Flight

- 3-1. Insert the coated end of a Firestar™ or other igniter through an open nozzle throat, aligned with the offset "moon" core, until it stops against the forward seal disk.
- 3-2. Secure the igniter to the nozzle with a piece of masking tape.
- 3-3. Install the motor into the rocket's motor mount tube. Ensure that the motor is securely retained in the rocket by using positive mechanical means to prevent it from being ejected during recovery system deployment.
- 3-4. Prepare the rocket's recovery system and then launch the rocket in accordance with the Tripoli Rocketry Association (TRA) Safety Code and National Fire Protection Association (NFPA) Code 1127.

## Chapter 4. Post-Recovery Cleanup

**NOTE:** Perform motor clean-up as soon as possible after motor firing. Propellant and delay residues become difficult to remove after 24 hours and can lead to corrosion of the metal parts. Place the spent motor components in the reload kit plastic bags and boxes and dispose of properly.

- 4-1. After the motor has cooled down, unthread and remove the forward and aft closures.
- 4-2. Remove the smoke charge insulator from the forward closure and discard. Using wet wipes or damp paper towels, remove all delay and propellant residue from the closures.
- 4-3. Remove and discard the forward and aft o-rings from the motor case. Remove the liner, forward seal disk and nozzle from the casing by pushing on the nozzle end and discard. **NOTE:** The phenolic seal disk provided with this reload kit is designed for one use only. Using wet wipes or damp paper towels, wipe the inside of the casing to remove all propellant residue.
- 4-4. Apply a light coat of grease to all threads and the inside of the motor case. Reassemble metal parts and store motor in a dry place.

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## Chapter 5. First Aid

For a minor burn, apply a burn ointment. For a severe burn, immerse the burned area in ice water at once and see a physician as quickly as possible. In the unlikely event of oral ingestion of the propellant, induce vomiting and see a physician as quickly as possible. The AeroTech/RCS composite propellant consists primarily of ammonium perchlorate and a rubber-like plastic elastomer.

## Chapter 6. Disposal

Damaged or defective reload kits should be returned to RCS.

## Chapter 7. Fire Safety

Tests show that the pyrotechnic components of RMS™ reload kits will not explode in fires and normally will not ignite unless subjected to direct flame and then will burn slowly. Use water to fight any fires in which AeroTech/RCS RMS™ reload kit pyrotechnic components may become involved: Direct the water at the AeroTech/RCS RMS™ reload kit pyrotechnic components to keep them below their 550 deg. F autoignition temperature. Foam and carbon dioxide fire extinguishers will NOT extinguish burning propellants of the type used in RMS™ reload kit pyrotechnic components. Keep reload kit pyrotechnic components away from flames, sources of heat and flammable materials.

## Disclaimer and Warranty

**NOTICE:** As we cannot control the storage and use of our products, once sold we cannot assume any responsibility for product storage, transportation or usage. RCS shall not be held responsible for any personal injury or property damage resulting from the handling, storage or use of our product. The buyer assumes all risks and liabilities therefrom and accepts and uses AeroTech/RCS products on these conditions. No warranty either expressed or implied is made regarding AeroTech/RCS products, except for replacement or repair, at RCS's option, of those products which are proven to be defective in manufacture within one year from the date of original purchase. For repair or replacement under this warranty, please contact RCS. Proof of purchase will be required. Note: Your state may provide additional rights not covered by this warranty.

P/N 20098 Rev. 10/1/07  
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Division of RCS Rocket Motor Components, Inc.

# HIGH-POWER RMS™

## Reloadable Motor System™

### RMS™ 98/10240 White Lightning™

**This Package Contains One Reload Kit:**

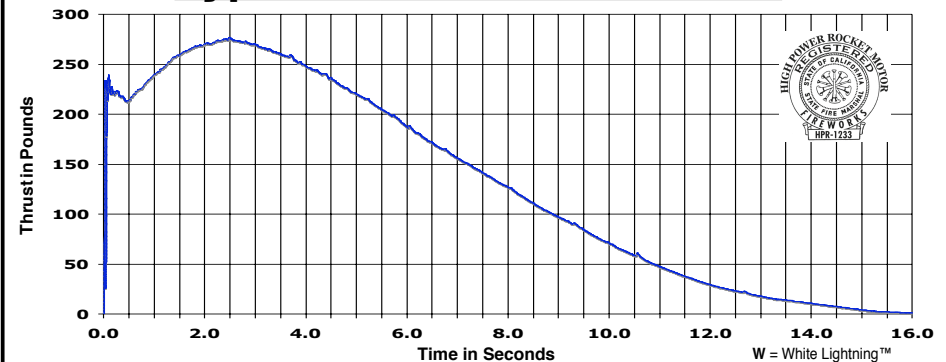
**M750W-P** (98/10240)

**NOTE:** This reload kit **MUST** be used with separately packaged M750W propellant grains (3 X P/N 03623 & 1 X P/N 03623-1) and motor liner tube (P/N 03040-4). RMS™-98 reload kits do not include an ejection charge. RMS™-98 motors must be used in conjunction with a timer, altimeter or radio-actuated recovery system. 98mm enlarged aft closure required for use, part no. 98AC2.

**NOTE:** This reload kit is *ONLY* for use in AeroTech/RCS, Dr. Rocket™ or Rouse-Tech™ RMS™ 98mm high-power motor hardware.  
Certified by the National Association of Rocketry (NAR).

**DO NOT OPEN RELOAD KIT UNTIL READY TO USE**

### Typical Time-Thrust Curve:



### RMS™ 98/10240 WHITE LIGHTNING™ RELOAD KIT DATA

Hardware Designation	Performance Designation	Total Impulse (Typical)	Propellant Weight	Loaded Motor Weight
RMS™-98/10240	<i>M750W-P</i>	9,325 N-sec	5,300 g (11.67 lb)	8,776 g (19.33 lb)

### RMS™ 98MM HARDWARE DATA

Hardware Designation	Motor Diameter	Motor Length	Hardware Weight	Reload Used
<i>RMS™-98/10240</i>	3.875" (98mm)	29.57"	2,367 g (5.21 lb)	M750W-P

**NOTE:** Motor lengths are measured from end of aft closure to end of forward closure.

**NOTE: SALE TO PERSONS UNDER 21 YEARS OF AGE PROHIBITED BY FEDERAL LAW. WARNING-FLAMMABLE: Read Instructions Before Use. KEEP OUT OF REACH OF CHILDREN. FOR USE ONLY BY CERTIFIED HIGH-POWER USERS 21 YEARS OF AGE OR OLDER. DO NOT SMOKE when loading these motors or use in the vicinity of open flames.**