

HIGH-POWER LMS-PLUS™ 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 LMS™ MOTORS AND MOTOR LOADING 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 MOTOR 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 hardware or motor loading 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 hardware or motor loading kit in any way will invalidate your motor warranty.

• **USE ONLY AEROTECH/RCS LMS™ MOTOR LOADING KITS AND MOTOR PARTS TO CONSTRUCT YOUR RMS™ LOADABLE MOTOR.** The AeroTech/RCS motor loading kits have been designed specifically for use with your particular AeroTech/RCS LMS™ motor hardware. Use of imitation components may destroy your motor, rocket and payload and will invalidate your motor warranty. Only use AeroTech/RCS LMS™ motor hardware intended for your specific AeroTech/RCS motor loading kit. **DO NOT INTERCHANGE PARTS!** Do not use AeroTech/RCS LMS™ motor loading kits or motor components for any other purpose than to construct an AeroTech/RCS LMS™ motor.

• **DO NOT REUSE ANY OF THE DISPOSABLE PARTS OF THE RMS™ MOTOR LOADING KIT.** This includes the case, 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 LMS™ operates at a lower temperature than most non-metallic 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 LOADING KIT UNTIL READY TO USE.

PARTS:

RMS™ HARDWARE (NOT INCLUDED)

54mm aft closure	1
54mm extended forward closure (std. or plugged)	1

MOTOR LOADING KIT

54K250 case (23.45" long unanodized)	1
54mm forward seal disk (unanodized)	1
Nozzle (black plastic part)	1
Liner (2" O.D. black plastic tube)	1
Propellant grain	1
Aft grain spacer (1" long X 1-7/8" O.D.)	1
Fwd & aft o-rings (1/8" thick X 2" O.D.)	2
Fwd seal disk o-ring (1/16" thick X 1-7/8" O.D.)	1
RMS-Plus™ smoke charge element (short solid part)	1
Smoke charge insulator (1-1/8" O.D. paper tube)	1
Smoke charge o-ring (1/8" thick X 1-1/8" O.D.)	1
Aft delay spacer (short colored paper tube)	1
Forward smoke charge spacer (1-1/8" O.D. washer)	1

ITEMS NEEDED FOR USE:

- Synco™ Super Lube™ or other grease
- FirstFire or other igniter
- Wet wipes or damp paper towels

SAVE THE MOTOR LOADING KIT PACKAGING MATERIALS FOR THE USED MOTOR PARTS. DISPOSE OF BAG AND PARTS PROPERLY.

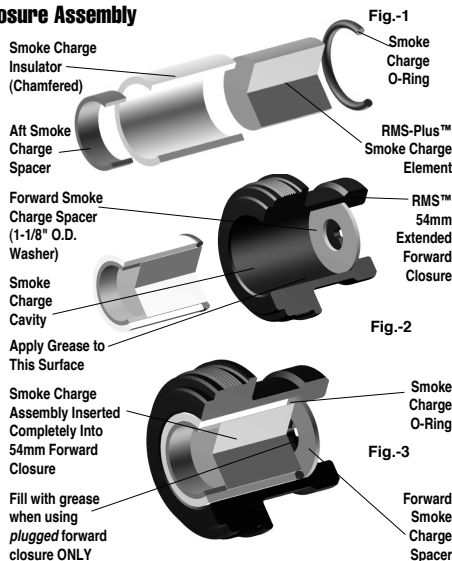
Chapter 1. Forward Closure Assembly

1-1. Apply a light coat of Synco™ Super Lube™ or other grease to all threads and all 4 o-rings. This will facilitate assembly and prevents the threads from seizing.

1-2. **Fig-1:** Chamfer both inner edges of the smoke charge insulator with your fingernail. Assemble the RMS-Plus smoke charge element, smoke charge insulator, aft smoke charge spacer and smoke charge o-ring as shown. **NOTE:** It is **not** necessary to tape the smoke charge element or insulator, the hot gas seal is provided by the smoke charge o-ring alone.

1-3. **Fig-2:** Insert the forward smoke charge spacer (1-1/8" O.D. neoprene washer) into the smoke charge cavity until it is seated against the forward end of the cavity. Apply a **light film** of grease to the inner circumference of the smoke charge cavity (but **not** the forward end of the cavity).

1-4. **Fig-3:** Insert the smoke charge assembly shown in Fig-1 into the smoke charge cavity, o-ring end first, until it is seated against the forward smoke charge spacer. **NOTES:** When using a **plugged** forward closure **ONLY**, fill the opening in the forward smoke charge spacer with grease prior to installing the smoke charge assembly, and install the smoke charge components in this order: Forward smoke charge spacer, smoke charge o-ring, smoke charge element, smoke charge insulator and aft smoke charge spacer.



Chapter 2. Case Assembly

2-1. **Fig-4:** Place the greased forward seal disk (1/16" thick X 1-7/8" O.D.) o-ring into the groove in the forward seal disk.

2-2. **Fig-5:** Insert the smaller (o-ring) end of the seal disk into one end of the liner tube until the seal disk flange is seated against the end of the liner.

2-3. **Fig-6: VERY IMPORTANT:** The K250W grain has a 1/4" wide slot combined with a tapered cutaway design that is wider at the nozzle end. In addition, there is a small chamfer cut into the propellant for easier igniter installation at the wider (nozzle) end. Install the propellant grain into the liner with the **chamfered end** of the propellant grain facing **away** from the **forward seal disk**. Installing the propellant grain incorrectly will result in motor failure!

2-4. **Fig-7:** Push the liner assembly into the motor case until it is equally recessed from both ends of the case.

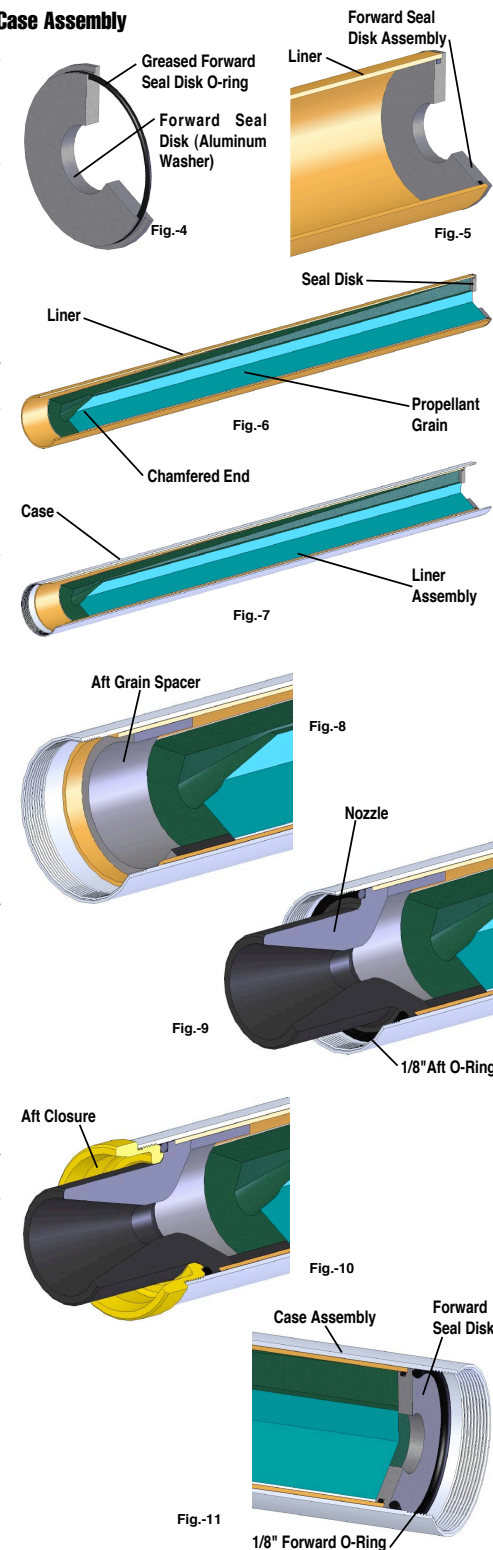
2-5. **Fig-8:** Install the aft grain spacer (1" long X 1-7/8" O.D. thick paper tube) into the open end of the liner until it is seated against the propellant grain.

2-7. **Fig-9:** Insert the nozzle into the open end of the liner tube until it is seated against the aft grain spacer and liner.

2-8. **Fig-9:** Place the greased aft (1/8" thick X 2" O.D.) o-ring into the groove around the nozzle insert.

2-9. **Fig-10:** Thread the aft closure into the motor case by hand until about 1/16" gap remains between the case and the closure. **NOTE:** Final tightening will be done after the other motor components are loaded into the case.

2-10. **Fig-11:** Place the greased forward (1/8" thick X 2" O.D.) o-ring into the case, seated against the forward seal disk.



2-11. Fig.-12: With the motor case held in a horizontal position, thread the completed forward closure assembly into the open end of the motor case by hand until it is seated against the case.

2-12. Finish tightening the aft closure by hand until it is seated against the case. **NOTE:** There will be some resistance to threading in the closure during the last 1/32" to 1/16" of travel. It is normal if a slight gap remains between the closure and the case after tightening and the grain rattles slightly inside the liner.

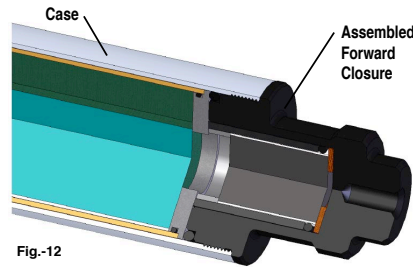


Fig.-12

Chapter 3. Preparation For Flight

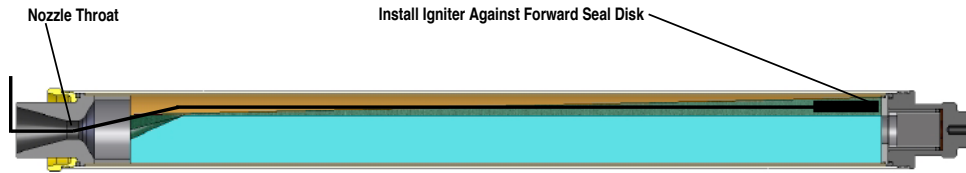


Fig.-13

3-1. Fig.-13: Insert the coated end of a FirstFire™, Firestar™ or other igniter through the nozzle throat until it stops against the forward seal disk. **NOTE:** Use great care in installing the igniter to ensure that it follows the narrow slot in the propellant completely to the forward end of the grain.

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 charge residues become difficult to remove after 24 hours and can lead to corrosion of the metal parts. Place the spent motor components in the motor loading kit packaging materials 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 assembly components from the forward closure and discard. Using wet wipes or damp paper towels, remove all smoke charge and propellant residue from the closures. **WARNING: FAILURE TO COMPLETELY REMOVE SMOKE CHARGE RESIDUE FROM THE INSIDE OF THE FORWARD CLOSURE CAN LEAD TO GAS LEAKAGE ON A SUBSEQUENT FLIGHT AND DAMAGE TO YOUR RMS MOTOR FORWARD CLOSURE AND ROCKET VEHICLE.** **NOTE:** Use of a plugged forward closure will eliminate the possibility of this failure mode.

4-3. Dispose of the motor casing and all internal motor components.

4-4. Apply a light coat of grease to the forward and aft closure threads and store closures 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 motor loading kits should be returned to RCS.

Chapter 7. Fire Safety

Tests show that the pyrotechnic components of LMS™ motor loading 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 LMS™ motor loading kit pyrotechnic components may become involved: Direct the water at the AeroTech/RCS LMS™ motor loading 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 LMS™ motor loading kit pyrotechnic components. Keep motor loading 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 20096 Rev. 4/3/07
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AEROTECH
CONSUMER AEROSPACE
Division of RCS Rocket Motor Components, Inc.

HIGH-POWER LMS™

Loadable Motor System™

With **RMS+™** Advanced Delay Sealing System

WHITE LIGHTNING™ PROPELLANT

This Package Contains One Motor Loading Kit:

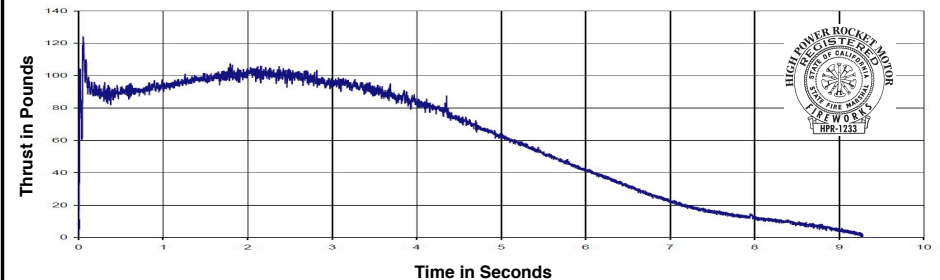
K250W-P/L

NOTE: This motor loading kit is sold in a "plugged" configuration only, and must be used with an RMS™ 54mm aft closure and 54mm extended or extended plugged forward closure (not included). RMS™ 54mm motor loading kits do not include an ejection charge. LMS™ loadable motors must be used in conjunction with a timer, altimeter or radio-actuated recovery system.

NOTE: This motor loading kit is *ONLY* for use with AeroTech/RCS, Dr. Rocket™ or Rouse-Tech RMS™ 54mm high-power motor hardware. Certified by the Tripoli Rocketry Association (TRA).

DO NOT OPEN MOTOR LOADING KIT UNTIL READY TO USE

Typical Time-Thrust Curve:



K250W-P/L MOTOR LOADING KIT DATA

Closure Designation	Performance Designation	Total Impulse (Maximum)	Propellant Weight	Loaded Motor Weight
RMS™-54 Aft & Ext. Fwd	<i>K250W-P/L</i>	2500 N-sec	1400 g (3.08 lb)	2294 g (5.06 lb)

RMS™ 54 LOADABLE MOTOR HARDWARE DATA

Hardware Designation	Motor Diameter	Motor Length	Hardware Weight	Loading Kit Used
<i>54K250 Case, 54mm Aft & Ext Fwd</i>	2.125" (54mm)	25.53"	579 g (1.28 lb)	K250W-P/L

NOTE: Total impulse shown is optimum. Motor length is 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.