

# RMS™ 29/40-120 Assembly and Operation Instructions

## BEFORE YOU BEGIN:

\* Study the illustrations and sequence of assembly. **THE SEQUENCE OF ASSEMBLY IS EXTREMELY IMPORTANT. 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 PART 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 INTER-CHANGE PARTS!** Do not use AeroTech/RCS RMS™ reload kits or motor components for any other purpose than to refurbish an AeroTech/RCS 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 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 codes of the National Association of Rocketry (NAR) and the Tripoli Rocketry Association and comply with all federal, state and local laws in all activities with hobby rockets.

## PARTS:

### RMS-29/40-120 MOTOR

29mm Aft Closure	1
29mm Case	1
29mm Forward Closure	1
Grease	1 tube

### RELOAD KIT

Liner (1" O.D. tube)	1
Propellant Grain (long slotted part)	2
Grain Adapter (7/8" O.D. tube)	0 or 1
Delay Grain (short solid part)	1
Delay Spacer (9/16" O.D. washer or tube)	0 or 1
Delay Insulator (5/8" O.D. tube)	1
Delay O-Ring (5/8" O.D. x 3/32" thick)	1
Forward Insulator (1" O.D. washer)	1
Aft O-Ring (1/16" thick x 1" O.D.)	1
Forward O-Ring (1/16" thick x 1" O.D.)	1
Nozzle (Black plastic part)	1
COPPERHEAD™ Igniter	1
Ejection Charge Container/Nozzle Cap	1

## ITEMS NEEDED FOR USE:

Wet wipes or damp paper towels  
Hobby knife or scissors  
Masking tape

1. Apply a light coat of grease to the 3 O-rings and all threaded surfaces. This will facilitate assembly and prevent the threads from siezing. **NOTE:** When all the grease that comes with the motor has been consumed, use petroleum jelly or similar grease.

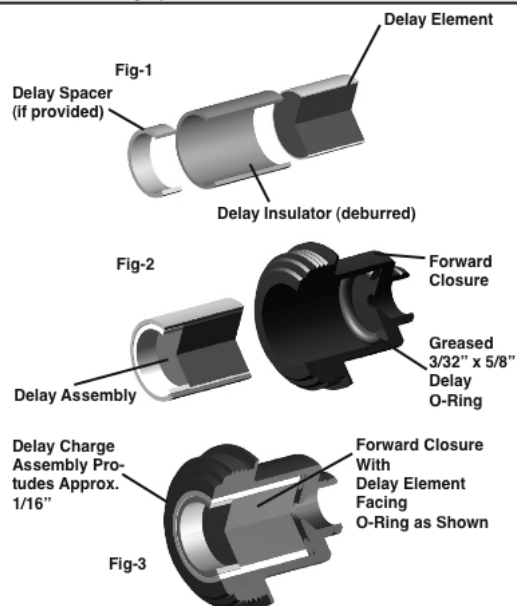
2. Using your fingernail or a blunt object, remove the burr (rough raised edge) from both inside and outside ends of the delay insulator tube by pressing or scraping and rotating the tube at the same time.

3. **Fig-1:** If supplied with the reload kit, press the delay spacer into one end of the delay insulator tube until **FLUSH** with the end of the tube.

4. **Fig-1:** Press the delay element into the other end of the delay insulator tube until it is **FLUSH** with the other end of the tube.

5. **Fig-2:** Place the greased 5/8" O.D. x 3/32" thick o-ring in the forward closure, seated against the forward end of the delay cavity.

6. **Fig-3:** Insert the delay charge/delay insulator assembly into the delay cavity until it is seated against the delay o-ring



6. **Fig-4:** Hold the two propellant grains joined end to end so that the slots in both grains are **in alignment** as shown. Apply a 1" to 1-1/2" long piece of clear tape to the joint between the grains to hold them together.

7. **Fig-4:** Remove the burr from the inside of the ends of the liner tube. Insert the taped propellant grains into the liner tube until one end of the joined grain is flush with the end of the liner tube.

8. **Fig-5:** Insert the liner assembly into the motor case until it is recessed equally from both ends of the case. Hold the liner assembly in place with your finger.

9. **Fig-5:** Place the forward insulator into the case, where the end of the propellant grain is flush with the end of the liner tube. Place the greased 1/16" x 1" forward o-ring against the forward insulator as shown.

10. **Fig-6:** Thread the forward (black) closure into the same end of the motor case by hand until it stops against the case.

11. **Fig-7:** Insert the black coated end of the COPPERHEAD™ igniter into the slot in the propellant grain until it stops against the delay element.

12. **Fig-8:** Using the point of a pencil, remove any plastic "flashing" that may still remain in the nozzle throat. Insert the nozzle into the open end of the motor case, with the igniter lead threaded through the nozzle throat, until the nozzle is in liner tube and seated against the propellant grain.

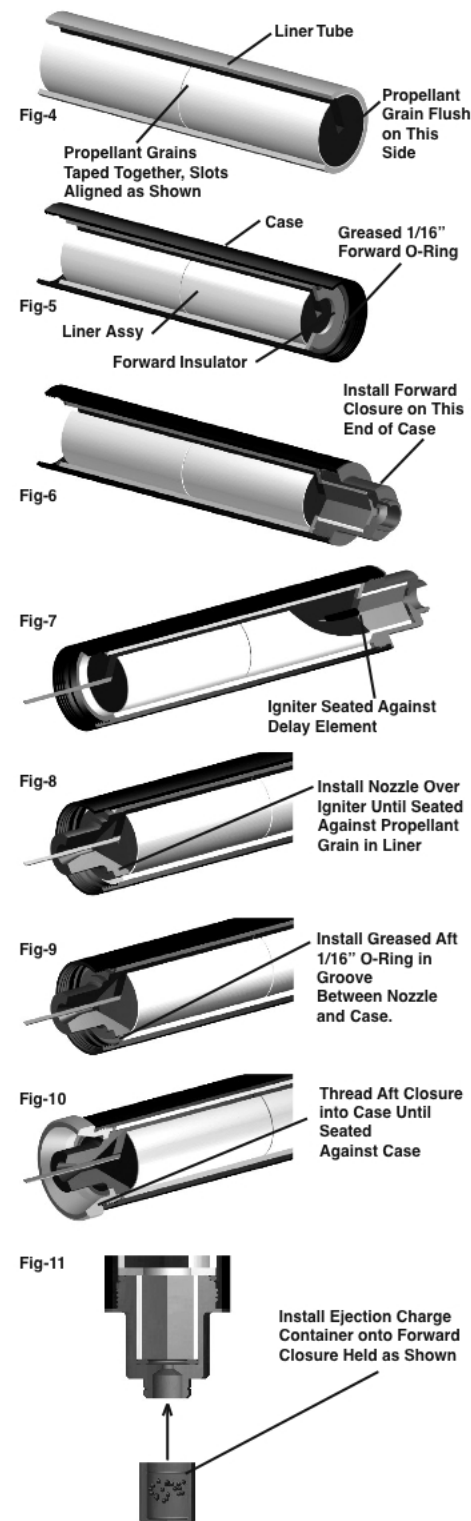
13. **Fig-9:** Place the greased aft o-ring (1/16" thick) into the groove between the nozzle and case.

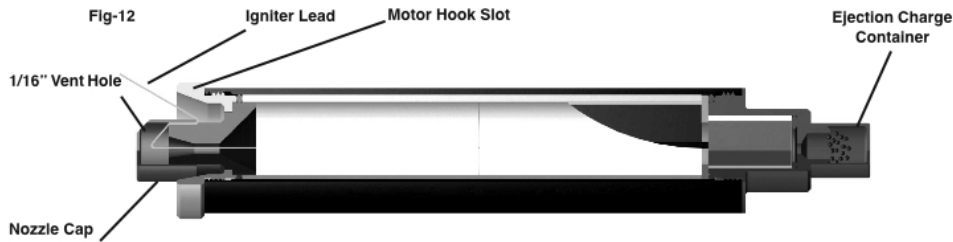
14. **Fig-10:** Thread the aft (gold) closure into the motor by hand until it stops against the end of the case. A rag or paper towel may be used to get a better grip on the closure.

15. **Fig-11:** Hold the ejection charge container/nozzle cap assembly with the nozzle cap (the wider plastic cap) pointing up. **CAREFULLY** remove the nozzle cap from the ejection charge container. Holding the motor in a vertical position with the **FORWARD** (black) closure pointing down, snap the ejection charge container over the matching end of the **FORWARD CLOSURE ONCE THE EJECTION CHARGE CONTAINER HAS BEEN SNAPPED INTO POSITION.** Loosening the forward closure will cause ejection charge to leak under the forward o-ring and may lead to seal failure.

16. With the motor held in a **NOZZLE DOWN** position, gently shake the motor several times to settle the ejection charge into the delay cavity above the delay element.

**NOTE:** If it becomes necessary to remove the **AFT** (gold) closure to replace the igniter due to misfire, hold the motor in a nozzle-up position and avoid moving the liner assembly in the case during the operation.





17. **Fig-12:** Using scissors or a hobby knife, cut a corner off the closed end of the nozzle cap to create a vent hole about 1/16" wide. Push the nozzle cap over the nozzle to hold the igniter in place.

### PREPARATION FOR FLIGHT

1. Install RMS motor into the rockets motor mount tube. Secure the motor into the rocket and prevent it from being ejected at the time of ejection charge firing by using a motor hook, friction fit, or wrapping tape around the junction where the motor meets the end of the rocket motor tube. If using a motor hook, be sure to hold the hook away from the motor during insertion into the motor tube to prevent the hook from scraping the motor casing. Position the hook tab into the slotted recess in the aft closure.
2. Prepare the rocket's recovery system and then launch the rocket by electrical means in the normal manner or as recommended by the rocket manufacturer.
3. **MISFIRES:** If a misfire occurs and a loaded AeroTech/RCS RMS motor does not ignite for any reason within

five seconds of pressing the launch button, release the launch button and remove the safety key from the electrical launch controller. WAIT ONE MINUTE before approaching or allowing anyone else to approach the rocket. Keep your fingers and hands out from underneath the rocket and away from the possible path of the motor exhaust jet. Do not place any part of your body over the launch pad. Disconnect the igniter clip from the COPPERHEAD™ Igniter. Carefully remove the rocket from the launch pad. Keeping the motor nozzle pointed away from your face and body - and away from any other person's face or body - remove the red plastic nozzle cap and repeat the motor preparation and launching process.

### POST-RECOVERY CLEANUP

**NOTE:** Perform RMS motor cleanup as soon as possible after motor firing. Propellant and delay residues become difficult to remove 24 hours after motor firing. These residues can lead to corrosion of the metal parts. **DISPENSE OF SPENT MOTOR COMPONENTS PROPERLY.**

1. After the motor has cooled down, remove the forward and aft closures. Using a wet wipe or damp paper towel, remove all delay, propellant and ejection charge residue from the closures.  
**WARNING: FAILURE TO COMPLETELY REMOVE DELAY RESIDUE FROM THE INSIDE OF THE FORWARD CLOSURE CAN LEAD TO GAS LEAKAGE AROUND**

**THE FORWARD O-RING ON A SUBSEQUENT FLIGHT AND DAMAGE TO YOUR RMS MOTOR FORWARD CLOSURE AND ROCKET VEHICLE.**

2. Remove the liner assembly and forward o-ring by pushing on the nozzle and discard. Remove the aft towel and discard.
3. Using a wet wipe or a damp paper towel, wipe the inside of the casing to remove all propellant residue.
4. Apply a light coat of grease to all threads and the inside of the motor case. Reassemble parts and store in a dry place.

### 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, delay or ejection charge, induce vomiting and see a physician as quickly as possible. The AeroTech/RCS composite rocket propellant consists of ammonium perchlorate and a rubber like plastic elastomer.

### DISPOSAL

Damaged or defective reloads should be returned to RCS.

**NOTICE:** As we can not 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

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### FIRE SAFETY

Tests show that composite propellant 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 fires in which AeroTech/RCS composite propellant RMS reload kits may become involved: direct the water at the AeroTech/RCS RMS reload kits to keep them below their 550° F autoignition temperature. Foam and carbon dioxide fire extinguishers will NOT extinguish burning propellant of the type used in AeroTech/RCS composite propellant RMS reload kits.

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.

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**AEROTECH**  
CONSUMER AEROSPACE

# RMS™ - 29/40-120

Fits All Kits Designed for "F & G" Motors

Division of RCS Rocket Motor Components, Inc.

## RELOADABLE MOTOR SYSTEM™

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

**NEW 2-Grain  
Version!**

**THIS PACKAGE CONTAINS:**

\* = NAR Certified  
Delay times

- G64-4W** SINGLE
- G64-7W** SINGLE
- G64-10W** SINGLE

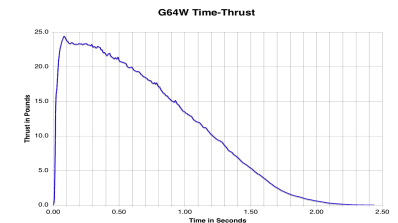
**IMPORTANT!** This reload kit is loaded in a manner different from most other Aero-Tech/RCS reload kits. **PLEASE READ ALL INSTRUCTIONS BEFORE USE!**

The reload kits shown above are **ONLY** for use in AeroTech/RCS RMS-29/40-120 motors.

**NOTE: SALE TO PERSONS UNDER 18 YEARS OF AGE PROHIBITED BY FEDERAL LAW. WARNING: FLAMMABLE: Read Instructions Before Use. KEEP OUT OF REACH OF CHILDREN. DO NOT SMOKE when loading these motors or use in the vicinity of open flames. FOR SAFE DISPOSAL READ INSTRUCTIONS.**

### TYPICAL TIME - THRUST CURVES:

Motor Type	Propellant Weight		Total Impulse		Average Thrust		Loaded Motor Weight	
	oz	gms	lb-sec	N-sec	lbs	N	oz	gms
<b>G64W</b>	2.1	60.0	25.9	115	14.4	64	5.3	155



W = White Lightning Propellant



**REQUIRES 12 VOLT LAUNCH SYSTEM**

Part # 20032B Rev. 8/9/06  
Made in the U.S.A.