

29MM KOSDON BY AEROTECH™ (KBA™) TRM™

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 KBA LOADED 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.**

• **DO NOT USE ANY PARTS OF THE KBA 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 KBA RELOAD KITS AND MOTOR PARTS TO REFURBISH YOUR KOSDON TRM MOTOR.** The KBA reload kits have been designed specifically for use in your particular Kosdon TRM motor. Use of imitation components may destroy your motor, rocket and payload and will invalidate your motor warranty. Only use KBA reload kits intended for your specific Kosdon TRM motor. **DO NOT INTERCHANGE PARTS!** Do not use KBA reload kits or motor components for any other purpose than to refurbish a Kosdon TRM motor.

• **DO NOT REUSE ANY OF THE DISPOSABLE PARTS OF THE KBA RELOAD KIT.** This includes the liner 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 KBA motor 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:

KBA TRM 29MM MOTOR HARDWARE

29-150 TRM case (G82W, G135R)	1
29-250 TRM case (H130W, H225R)	1
29mm TRM forward bulkhead	1
29mm TRM nozzle w/.221" throat (29-150)	1
29mm TRM nozzle w/.290" throat (29-250)	1
29mm nozzle washer (steel)	1
29mm snap rings	2
1/2-13 bolt	1

KBA TRM RELOAD KIT

Propellant grains	3 or 5
Liner tube	1
Silicone o-rings (1" O.D. X 3/32")	2
Delay insulator (.875" O.D. X .790" long)	1
Delay o-ring (22.5 mm O.D. X 3.75 mm thick)	1
Aft delay spacer (.615" O.D. colored paper ring)	1 or none
Forward delay spacer (7/8" O.D. neoprene washer)	1
Delay element (.61" O.D. solid part)	1

ITEMS NEEDED FOR USE:

- Synco™ Super Lube™, Dow Corning 111 or other grease
- Snap ring pliers
- FFFFG black powder
- Masking tape or paper wadding
- 7/8" O.D. wooden dowel
- Wet wipes or damp paper towels

SAVE THE RELOAD KIT PLASTIC BAG FOR THE USED RELOAD PARTS. DISPOSE OF BAG AND PARTS PROPERLY.

Chapter 1. Forward Bulkhead Assembly

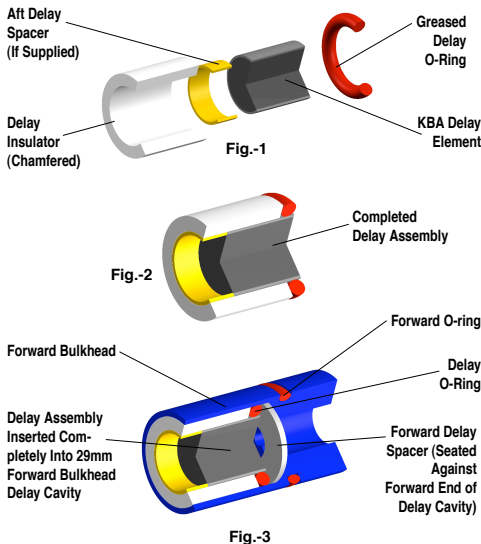
1-1. Apply a light coat of Synco™ Super Lube™ or other grease to all three (3) o-rings. This will facilitate assembly and promotes proper sealing of the o-rings.

1-2. **Fig.-1 & 2:** Chamfer both inner edges of the delay insulator with your fingernail. Assemble the KBA delay element, delay insulator, aft delay spacer (if supplied) and delay o-ring as shown.

1-3. **Fig.-3:** Insert the forward delay spacer (7/8" O.D. neoprene washer) into the forward bulkhead delay cavity until it is seated against the forward end of the cavity. Apply a **light film** of grease to the inner circumference of the delay cavity (but **not** the forward end of the cavity).

1-4. **Fig.-3:** Insert the completed delay assembly shown in Fig.-2 into the forward bulkhead delay cavity, o-ring end first, until it is seated against the forward delay spacer. **NOTE:** If required, apply grease or masking tape on the outside of the delay assembly for a snug fit in the bulkhead.

1-5. **Fig.-3:** Install a greased 1" O.D. X 3/32" o-ring in the outside groove in the forward bulkhead.



Chapter 2. Case Assembly

2-1. **Fig.-4:** Place the greased nozzle o-ring (1" O.D. X 3/32") into the groove in the graphite nozzle.

2-2. **Fig.-4:** Put grease on your index finger and wipe a film of grease on the I.D. of both ends of the case. Using a twisting motion, install the nozzle into the end of the case that has the external snap ring groove (if applicable). Note from the drawing the proper orientation of the nozzle.

2-3. **Fig.-5:** Install the steel nozzle washer in the case, seated against the graphite nozzle.

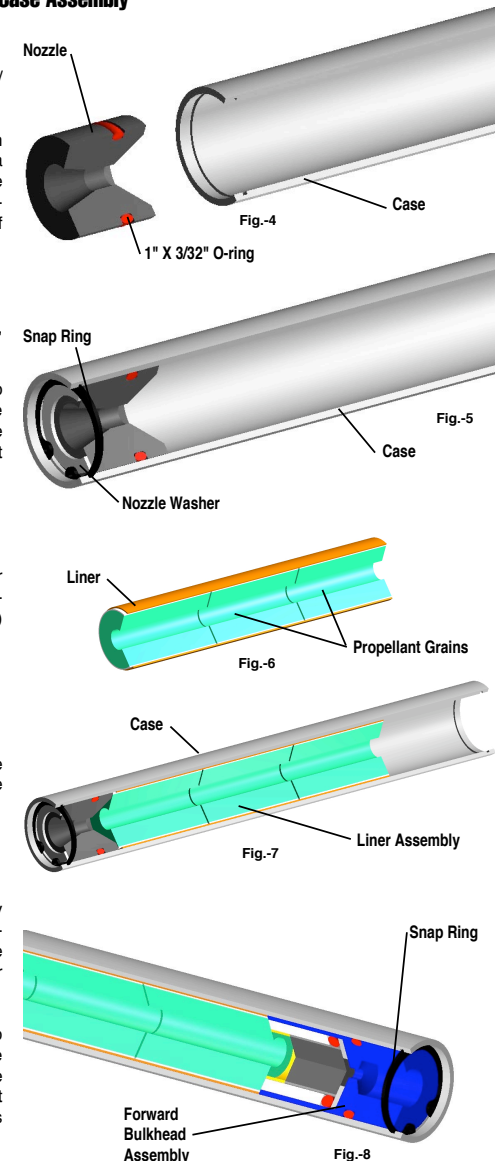
2-4. **Fig.-5:** Using the snap ring pliers, install a 29mm snap ring into the internal groove on the nozzle end of the case. To prevent eye injury if a snap ring slips out of the pliers, wear eye protection and hold the motor casing at a right angle to yourself.

2-5. **Fig.-6:** Install the propellant grains into the paper liner tube. **NOTE:** Only three grains are shown in all illustrations for clarity. TRM-29-150 motors use three (3) grains, and TRM-29-250 motors use five (5) grains.

2-6. **Fig.-7:** Apply a light coat of grease to the outside surface of the liner. Install the liner assembly into the case until seated against the nozzle.

2-7. **Fig.-8:** Using a twisting motion, install the previously assembled forward bulkhead assembly into the forward end of the motor case until it is seated against the propellant grains. Note from the drawing the proper orientation of the forward bulkhead.

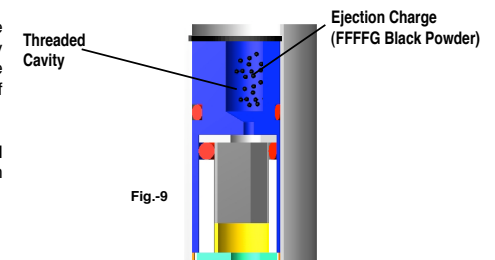
2-8. **Fig.-8:** Using the snap ring pliers, install a 29mm snap ring into the internal groove on the bulkhead end of the case. To prevent eye injury if a snap ring slips out of the pliers, wear eye protection and hold the motor casing at a right angle to yourself. **NOTE:** It is normal if the grains rattle slightly inside the case.



Chapter 3. Ejection Charge Installation

3-1. **Fig.-9:** Dispense enough FFFFG black powder into the threaded cavity of the forward bulkhead to reliably activate the recovery system in the rocket that the motor is going to be installed in. Seal the open end of the cavity with paper wadding and/or masking tape.

3-2. **Fig.-9:** With the motor held in a **NOZZLE DOWN** position, gently shake the motor to settle the ejection charge into the cavity above the delay element.



Chapter 4. Preparation For Flight

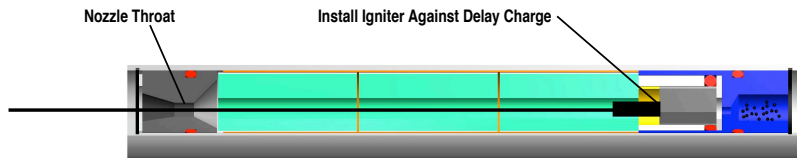


Fig.-10

- 4-1. 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 at the time of ejection charge firing.
- 4-2. Fig.-10: Insert the coated end of a FireStar™ or other igniter through the nozzle throat until it stops against the delay element.
- 4-3. Prepare the rocket's recovery system and then launch the rocket in accordance with the kit manufacturer's instructions and the Tripoli Rocketry Association (TRA) and/or the National Association of Rocketry safety code.

Chapter 5. Misfires

If a misfire occurs and a loaded KBA 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 exhaust jet. Do not place any part of your body over the launch pad. Disconnect the igniter clips from the electrical igniter. Carefully remove the igniter from the motor, and install a new igniter and repeat the launching process.

Chapter 6. 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 bag and dispose of properly.

- 6-1. After the motor has cooled down, remove the snap rings and the aft steel washer from the case.
- 6-2. Insert the 1/2-13 bolt into the threaded cavity of the forward bulkhead and remove the bulkhead using a twisting and pulling motion.
- 6-3. Using a wooden dowel or similar instrument inserted into the forward bulkhead end of the case, gently push the nozzle out of the casing.
- 6-4. Remove the spent grain cartridges from the case and discard. Remove the delay insulator, delay o-ring and forward delay spacer from the forward bulkhead and discard. Remove and discard the nozzle o-ring and the forward bulkhead o-ring. Using wet wipes or damp paper towels, wipe the inside of the casing, nozzle and forward bulkhead to remove all propellant, delay and ejection charge residue. **WARNING: FAILURE TO**

Kosdon by AeroTech Division
RCS Rocket Motor Components, Inc.
Cedar City, UT 84721
www.aerotech-rocketry.com

COMPLETELY REMOVE DELAY RESIDUE FROM THE INSIDE OF THE FORWARD CLOSURE CAN LEAD TO GAS LEAKAGE ON A SUBSEQUENT FLIGHT AND DAMAGE TO YOUR KBA MOTOR FORWARD BULKHEAD AND ROCKET VEHICLE.

- 6-5. Apply a light coat of grease to the exterior of the forward closure and the inside of the motor case. Store motor parts in a dry place. **DO NOT** store ungreased nozzle in casing which can lead to severe corrosion of the case.

Chapter 7. 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 KBA reload kit composite propellant consists primarily of ammonium perchlorate and a rubber-like plastic elastomer.

Chapter 8. Disposal

Damaged or defective reload kits should be returned to RCS.

Chapter 9. Fire Safety

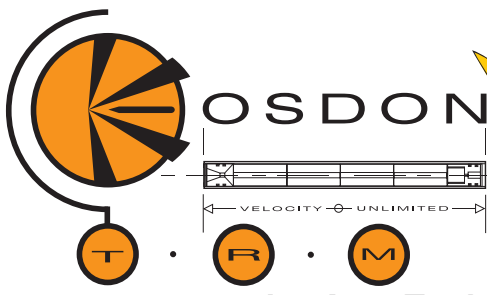
Tests show that the pyrotechnic components of KBA reload kits will not explode in fires and normally will not ignite unless subjected to direct flame and then will burn slowly. Use water to fight any fires in which KBA reload kit pyrotechnic components may become involved: Direct the water at the KBA 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 KBA 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 and/or Kosdon Enterprises 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 RCS/KBA products on these conditions. No warranty either expressed or implied is made regarding RCS/KBA 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.

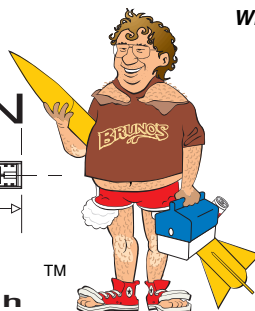
P/N K08001 Rev. 2/6/09
Made in U.S.A.

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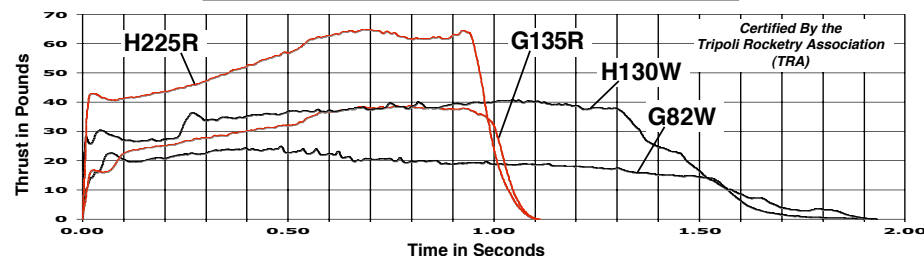
With **RMS PLUS**™
Advanced Delay Sealing System

DO NOT OPEN RELOAD KIT UNTIL READY TO USE



29-150 & 29-250 KOSDON TRM™ BY AEROTECH™ (KBA™) RELOAD KIT

TYPICAL TIME-THRUST CURVES:



NOTE: Kosdon TRM™ by AeroTech reload kits do not include an ejection charge. Use FFFFG black powder.

THIS PACKAGE CONTAINS ONE KOSDON TRM™ BY AEROTECH RELOAD KIT:

G82W-M (29-150) G135R-M (29-150) H130W-M (29-250) H225R-M (29-250)

The reload kits shown above are **ONLY** for use in KOSDON TRM™ 29mm High-Power motors.

W = White Lightning™, R = Redline™ Short = approx. 6 sec, Medium = approx. 10 sec., Long = approx. 14 sec.

NOTE: This reload kit is sold in a single delay or "plugged" configuration only. For other delays, use one of the appropriate Kosdon Delay Kits (KDK's) for the delay time desired. Please refer to the KDK cross-reference list on back of the reload kit header card for proper KDK selection.

KOSDON TRM-29-150 & 29-250 RELOAD KIT DATA

Hardware Desig.	Performance Desig.	Total Impulse (Typ.)	Propellant Wt.	Loaded Motor Wt.
TRM™-29-150	G82W	140 N-sec	84 g (0.185 lb)	231 g (.509 lb)
TRM™-29-150	G135R	146 N-sec	80 g (0.400 lb)	226 g (.498 lb)
TRM™-29-250	H130W	244 N-sec	140 g (0.308 lb)	322 g (.709 lb)
TRM™-29-250	H225R	243 N-sec	133 g (0.293 lb)	316 g (.696 lb)

KOSDON TRM-29-150 & 29-250 HARDWARE DATA

Hardware Desig.	Throat Dia.	Motor Diameter	Motor Length	Hardware Weight	Reloads Used
TRM™-29-150	.221"	1.125" (29mm)	8.10"	123 g (0.271 lb)	G82W, G135R
TRM™-29-250	.290"	1.125" (29mm)	11.44"	156 g (0.344 lb)	H130W, H225R

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.