



# Contrail Rockets

## 98mm Hybrid Rocket Motor Reload Instruction Manual

Congratulations on your purchase of a Contrail Rockets 98mm Hybrid Reload. The supplied motor reload has been designed to operate in Contrail Rockets Hardware only. Before you begin assembly of this reload, please read through this manual and familiarize yourself with the steps. If you have any questions please contact Contrail Rockets.

### Included With this Reload Package is:

Quantity	Item Name
1	Fuel Grain
5 or 9*	Press-Lock Injectors (User Selected At Time of Purchase)
2	Igniters (24 Volt Resistor Type Igniter)
2 or 4*	Nylon Fill Lines (User Selected At Time of Purchase)
1 or 3*	Nylon Crossover Line (Short version of item above)
1	1/8 Inch Vent Line (Clear)
2	O-Rings (Size 236)
1	Instruction Manual

\* Denotes Items included w/ 8 Injector Reloads (Fast/X-Fast)

### Not Included With this Reload Package is:

Synthetic Type Grease (Mobile 1 Synthetic or Similar Recommended)  
 Pyrodex Pellets (Muzzle Loading Pellets, Size 50/50 Recommended)  
 Deep Wall Socket Set  
     7/16 Inch Socket for 1/8, and 3/16 Inch Injectors  
     1/2 Inch Socket for 1/4 Inch Injectors  
     9/16 Inch Socket for 5/16 Inch Injectors  
 Allen Wrench (5/16 Inch Allen Wrench for 98mm Motors)  
 Good Pair of Cutters (Recommended: Radio Shack Coax Cable Cutters)  
 Roll of Electrical Tape  
 Cleaning Supplies for Post Flight Cleanup

# Motor Assembly Instructions



**Step 1:** Ensure that your motor hardware is clean and free from grease, oils, dirt and debris. Wipe the motor components with soap and water, to cut any residual grease from previous firings. Make sure you have all required tools and parts for motor assembly.

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**Step 2:** Begin by installing all O-Rings onto Nozzle and Injector Baffle. All O-rings are Dash Number 236. O-Rings should be free from any cracks, burns or damage.



**Step 3:** Insert Press Lock Fittings into the Injector Face. A 1/8 Inch Fitting will always go in the center port. The Fittings should be tightened 1/2 turn past tight. If only 4 Injectors are used (Slow and Medium Motors) the Injectors should alternate radically with a steel plug. (4 Steel Plugs will be included with the necessary reloads)

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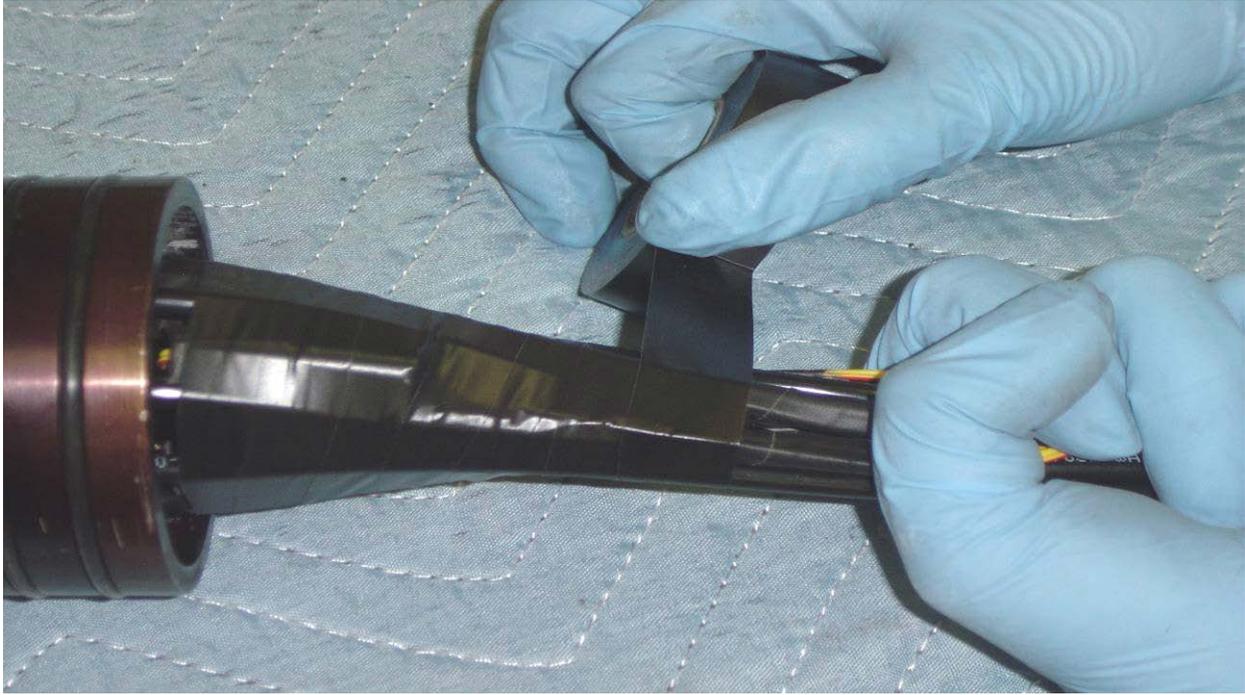




**Step 4: (Previous 4 Photo's):** Verify that you have the correct size and number of Pyrodex Pellets for your reload and then slide the igniter wire through the center hole of the pellet. Bend the resistor to the side of the powder pellet as shown. For 98mm motors we recommend (2) 50 Caliber/50 Grain Pyrodex Pellets for each line. Ensure that you have placed the Resistor 90 Degrees away from the Nylon Line. This ensures proper ignition of the Pyrodex Pellet before the line bursts. The Pyrodex Pellets should be taped together and it is recommended that 2 wraps of Electrical tape should be sufficient over the entire igniter assembly to ensure ignition. Too Much Electrical Tape can be a bad thing and cause the pellets to burn to fast. You only need enough tape to hold them to the line. Prior to Moving onto the next step, ensure the lines are cut square and at a length of approximately  $\frac{3}{4}$  of an inch from the top of the Pyrodex Pellets.



**Step 5:** Insert the Fill lines w/ Pyrodex Pellets attached into the injector baffle on opposite sides. Ensure that the nylon lines go all the way into the press locks and go past the O-Ring Seal. You will feel it go past the O-ring and seat at the bottom of the fitting. You will now insert the clear vent line into the center fitting, and the short crossover line/lines into the last fittings. Ensure that all the lines are secure in the fittings prior to moving on.



**Step 6:** Using your roll of electrical tape, start taping around all nylon lines. This will slightly pull the lines towards the center of the motor, and ensure the heat of the Pyrodex Pellets at ignition is kept near the lines to ensure a positive ignition. You will only need a single layer of tape over the line set to hold them together.

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**Step 7:** Grease the Injector Baffle O-rings and slide the nitrous tank section of the motor onto the combustion chamber and insert the retention bolts. The bolts will require a 5/16 inch hex head wrench.

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**Step 8:** Grease the included fuel grain with a synthetic type grease (Mobil 1 or similar) and slide the fuel grain into the combustion chamber. Ensure that the fill lines, vent line and igniter wires are all drawn through the core of the grain. A thin coating of grease is all that is required.



**Step 9:** Grease the Nozzle O-rings and slide the nozzle into the combustion chamber. If you will be using a retaining ring on the nozzle, be sure to put this onto the nozzle prior to bolting it into the combustion chamber.

***You're Now Done Assembling your Contrail Rockets  
Hybrid Rocket Motor.***

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## **Venting Instructions**

75mm and larger Contrail Hybrids do not require a vent hole on the top of the motor. Instead, the motor will vent nitrous oxide through the combustion chamber. Prior to motor ignition, the clear nylon line is routed through the combustion chamber and to wherever the user prefers. A Re-usable Silver colored fitting is attached to the end of the clear line. It is a good idea to secure this fitting to your launch pad so that you can find it after the motor has fired. The Fitting has a restrictor inserted into the fitting, which allows for a positive vent stream to be seen when the motor is full and ready for launch.

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# Launch Setup and Procedure

- In order to fire any Conrail Rockets Hybrid Motor you will need to have available a Hybrid Ground Support System. We recommend the Conrail Rockets Ground Support System, or the Pratt Hobbies Ground Support System. For More information on Ground Support Contact your favorite hybrid vendor. Pad Setup is Simple.
  - No Hybrid Motor should be operated when Nitrous Oxide Pressures are less than 600 psi or more than 900 psi.
  - It is required that you fill your Hybrid Motor from a Distance of no less than 100 Feet.
  - Manufactures of Hybrid Ground Support will be more able and willing to help assist you in the pre flight setup and procedures which go along with there equipment. If you are not familiar with there equipment, ask them prior to use.
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## Warnings

- Only Conrail Rockets Certified Reloads are to be used in Conrail Rockets Hardware. The use of any other manufactures reload in Conrail Rockets Hardware will void your warranty and will also render the assembled motor non-certified.
  - Never Approach a Hybrid Motor when filling or while the motor has pressurized Nitrous Oxide in it.
  - After Firing your motor, it may be hot, and should be handled with care.
  - Always Wear Protective Eyewear, Gloves, and Clothing when working with Hybrid Motors, or Ground Support.
  - Always follow the Tripoli Safety Code as well as the NFPA Safety Code for Mid and High Power Rocketry.
  - Not heeding these warnings could result in injury of yourself or others.
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## Disposal and Cleanup

If for any reason you need to return or dispose of your reload, please contact Conrail Rockets LLC. for information on how to return the item. Appropriate shipping and handling, as well as packaging requirements may be necessary. Any used items should be disposed of in the proper trash receptacle.

# Disassembly and Motor Cleaning

## Necessary Items:

- Broom Stick or Long Dowell for removing Internals (at least the length of the combustion chamber)
- Soap and Water for Cleanup
- Paper Towels
- Lighter Fluid for Cleaning Nozzles
- Socket Set for Removal of Press Lock Fittings

Once you have fired the motor and it is time for cleanup you should begin by removing the retention bolts holding in the combustion chamber section only. Never disassemble the Nitrous Oxide Portion of the Motor. This will void all warranties. Remove the burned up press lock fittings in the injector face. Next, remove the burned grain from the combustion chamber and dispose of. Everything will then need to be cleaned using soap or lighter fluid. O-rings should be checked for cracks or burns, and replaced as necessary.

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## Safety and First Aid

Conrail Rockets Hybrid Motor Reloads will not burn without the presence of a High Temp Heat Source, and strong oxidizer. If for some reason, any part of a reload is ingested, induce vomiting and seek medical attention.

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## Disclaimer

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# Warranty

Our Products are Warranted for a time period of one year, from the date of original purchase. The warranty expressed by Contrail Rockets LLC., covers defects in material or workmanship. There shall be no expressed or implied warranty, which covers any item damaged, through the use of a Contrail Rocket Motor. This includes the motor hardware, electronics, and any other items which suffer from the misuse, neglect caused by the user. Contrail Rockets LLC. Reserves the right to alter the Warranty at any time, at their discretion.

## Contact Information

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Manufacture Date: