

# **Centuri** Model Rocket Engine

## OPERATING INSTRUCTIONS

FOR STANDARD ENGINES (.7" DIAM.) & MINI-MOTORS (.5" DIAM.)

### WARNING FLAMMABLE

KEEP OUT OF REACH OF SMALL CHILDREN.

**PURPOSE & RESTRICTIONS:** Centuri model rocket engines are NAR approved solid propellant engines intended only for educational and experimental flying of lightweight, non-metallic, recoverable model rockets.

Never tamper with or attempt to reload a model rocket engine. Never use a damaged rocket engine.

Model rockets are designed to be launched only from standard remote-controlled electrical launch systems. Always use the recommended engines and recovery wadding.

Never point the nozzle of an engine towards anyone. Comply with all Federal, State, and local laws.

**STORAGE:** Store engines in a cool, dry place. Never expose to temperatures greater than 150° Fahrenheit.

**DISPOSAL:** Damaged, defective and unwanted engines should be destroyed by soaking in water.

**LIABILITY & WARRANTY:** Centuri Engineering Company shall not be liable for any personal injury or property damage resulting from storage, handling, or use of these rocket engines. The user assumes all risks and uses these engines on these conditions. Because of storage, use, and handling conditions beyond the control of the seller, CENTURI Engineering Company makes no warranty, either expressed or implied, regarding the reliability and performance of these model rocket engines.

**ROCKET ENGINE SELECTION:** Consult the package or the instructions which came with your model rocket kit for the recommended engines to use. Engines are manufactured in a wide range of powers and characteristics, each for a specific purpose.

### TYPICAL ENGINE CODING



#### TOTAL THRUST CODE

A Total "power" rated in newton-seconds. Each class (letter) is twice as powerful as previous class (example: "B" engine equals 2 "A" engines).

#### AVERAGE THRUST CODE

5 Amount of force (newtons) per second.

#### DELAY CODE

4 Has nothing to do with power. This number indicates, in seconds, time between engine burnout and recovery system deployment.

A general rule-of-thumb on engine selection is that small diameter lightweight rockets require long delays, and larger, heavier rockets need a short delay. Examples:

Rocket	Diam.	Weight	Engine	Delay
Javelin	0.7"	.6 - 1.0 oz.	B4-6	Long
Taurus	1.3"	2.5 - 3.0 oz.	B4-4	Medium
Orion	2.0"	4 - 5 oz.	B4-2	Short

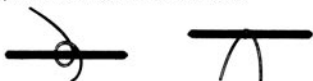
**BOOSTER ENGINES:** (Example: A8-0) are for staged models. They contain propellant, but no delay or ejection material. Never use a booster engine in a single-stage model!

### ASSEMBLING THE IGNITERS

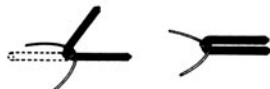
Sure-Shot® Igniters are the most reliable commercial igniters available, well worth the care of assembly. Igniters are also available separately. Cat. No. IG-12, 12 for 60¢

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- 1 Loop wire once around middle of stick.



- 2 Bend stick in half.



- 3 Insert into engine nozzle.

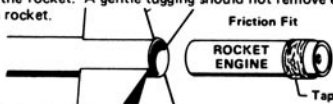


- 4 Separate the wires and apply dot.



**HOW THE IGNITER WORKS:** When activated by the rocketeer, electricity passes through the nichrome wire. Being resistant to the flow of electricity, the nichrome wire glows red hot, igniting the stick which, in turn, ignites the engine propellant.

**MOUNTING THE ENGINE:** The engine MUST be mounted securely into the rocket to prevent engine "kickout" and insure proper parachute ejection. If the model is equipped with an engine lock, simply push the engine in until the lock snaps over the end. In lieu of an engine lock, wrap strips of masking tape around the engine to "friction fit" it snugly into the rocket. A gentle tugging should not remove engine from rocket.



**PREPARING THE ROCKET FOR FLIGHT:** Always double check the recovery system before launching.



Flameproof Wadding is necessary to protect the recovery system from the hot ejection gases! Wadding must also be Flameproof type to avoid starting fires

### FLAMEPROOF CREPE WADDING INSTRUCTIONS

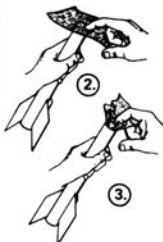
1. Select number of sheets needed for recovery

BODY DIAMETER	SHEETS REQUIRED
#5 .5 inch	1
#7 .7 inch	2
#8 .8 inch	3
#10 1.0 inch	4
#13 1.3 inches	4
#16 1.6 inches	5
#20 2.0 inches	6

2. Center one sheet across open body tube.

3. Push individual sheet into body tube, with one finger. REPEAT until required number of sheets are used.

4. Finish other rocket prepping as explained in engine instructions.



### BULK WADDING INSTRUCTIONS

When using bulky-type wadding (such as flameproof cotton batting) pack it loosely with a thickness of about twice the inside diameter of the rocket.

**LAUNCH SET UP:** Your rocket must be launched from a guide-rod launcher which will keep the rocket in a vertical flight direction until stabilizing velocity is reached.

During an actual launching, the individual in control of the firing should never stand closer than 10 feet to the rocket. Assistants and spectators should stand back much further, for a better view.

**LAUNCH AREA:** Choose an area free of highways, powerlines, trees and buildings, and with side dimensions roughly equal to at least half the expected altitude. Choose soft dirt or grassy area.

**WIND:** Do not launch in winds over 20 mph. For mild breezes, tilt launch pad slightly into wind, to compensate for parachute drift.

**WEATHER COCKING:** Launch within 30 degrees of the vertical. Rockets tend to head into the wind, like a weathervane. This "weather-cocking" decreases altitude and may cause the rocket to fly unpredictably.

## LAUNCH PROCEDURE

1. **IMPORTANT:** Attach micro clips to igniter wires as close as possible to the nozzle. In most launch systems there should be no more than  $\frac{3}{4}$ " of igniter wire between micro clips, or your igniter may not heat up sufficiently. Make sure the clips are not touching each other or the metal exhaust deflector.
2. Check for aircraft, pedestrians or automobiles in area.
3. Close the safety switch and check continuity light.
4. Alert spectators to stand back, and begin countdown.

### IF ENGINE FAILS TO IGNITE

1. **WAIT AT LEAST 1 MINUTE** before approaching the rocket.
2. Remove the rocket from the launcher.
3. Connect a  $\frac{3}{4}$ " piece of nichrome wire between the micro clips. Close firing circuit and watch for nichrome to glow red hot.
- 4a. If the nichrome glows red hot: Re-check igniter installation. Refer to step 1 in "Launch Procedure".
- 4b. If nichrome glows faintly or not at all: Your problem could be any one or more of the following conditions:
  - Micro clips dirty – straighten and clean with emery board or fine sandpaper. This is a common problem, because the clips get dirty after repeated use.
  - Battery weak or dead – replace or recharge.
  - Switches not closing properly – bend contacts. Test switch in another circuit if possible.
  - Loose wire connections – check all connections.

**GENERAL SAFETY:** If a rocket should become unstable and crash into the ground, do not approach until the ejection charge has functioned.

Avoid eye injury by capping the exposed tip of launch rod with expended engine casing, when not actually launching! Follow instructions and the Safety Code, and have many happy hours with Model Rocketry!



**FIRST AID:** For mild burns use a first aid burn ointment. For more severe burns consult a physician immediately. Identify as a powder burn. If propellant is swallowed, induce vomiting and call a physician immediately. Advise him that propellant is composed of potassium nitrate, charcoal and sulphur.

**IN CASE OF FIRE:** Extinguish fires near or among model rocket engines in a normal manner, with water. Call the Fire Department immediately if there is the slightest danger of the fire getting out of control.

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