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Standard Motor Codes

How To Interpret Rocket Motor Codes

Sport rocket motors approved for sale in the United States are stamped with a three-part code that gives the modeler some basic information about the motor's power and behavior:

1. A letter specifying the total impulse ("C");
2. A number specifying the average thrust ("6");
3. A number specifying the time delay between burnout and recovery ejection ("3").

Total Impulse

Total impulse is a measure of the overall total energy contained in a motor, and is measured in Newton-seconds. The letter "C" in our example motor above tells us that there is anywhere from 5.01 to 10.0 N-sec of total impulse available in this motor.

In a typical hobby store you will be able to find engines in power classes from 1/8A to D. However, E, F, and some G motors are also classified as model rocket motors, and modelers certified for high power rocketry by the NAR can purchase motors ranging from G to O.

Since each letter represents twice the power range of the previous letter, total available power increases rapidly the further you progress through the alphabet.

Hobby Rocket Motor Information			
Classification	**Impulse Range**	**Impulse Limit**	**Category**
Model Rocket	1/8A	0.3125	Micro
	1/4A	0.625	Low Power
	1/2A	1.25	
	A	2.5	
	B	5	
	C	10	
	D	20	
	E	40	Mid Power
	F	80	
	G	160	
High Power	H	320	Level 1
	I	640	
	J	1280	Level 2
	K	2560	
	L	5120	
	M	10240	Level 3
	N	20480	
	O	40960	

Average Thrust

Average thrust is a measure of how slowly or quickly the motor delivers its total energy, and is measured in Newtons. The "6" in our example motor tells us that the energy is delivered at a moderate rate (over about 1.7 seconds). A C4 would deliver weaker thrust over a longer time (about 2.5 seconds), while a C10 would deliver a strong thrust for a shorter time (about a second). Note, however that the average thrust printed on the motor may differ greatly from the actual average thrust of the motor. You should check the engine data sheets at http://www.nar.org/SandT/NARenglist.shtml for an accurate value. Just click on the motor designation for a particular motor to get a sheet with the actual as-tested numbers for every NAR certified motor.

As a rule of thumb, the thrust duration of a motor can be approximated by dividing its total impulse by its average thrust.

Keep in mind that you cannot assume that the actual total impulse of a motor lies at the top end of its letter's power range -- an engine marked "C" might be engineered to deliver only 5.5 Newton-seconds, not 10.

Time Delay

The rocket is traveling very fast at the instant of motor burnout. The time delay allows the rocket to coast to its maximum altitude and slow down before the recovery system (such as a parachute) is activated by the ejection charge.

The time delay is indicated on our sample motor is 3 seconds. Other typical delay choices for C engines are 5 and 7. Longer delays are best for lighter rockets, which will coast upwards for a long time. Heavier rockets usually do better with shorter delays -- otherwise the rocket might fall back down to the ground during the delay time.

Motors marked with a time delay of 0 (e.g., "C6-0") are booster engines. They are not designed to activate recovery systems. They are intended for use as lower-stage engines in multi-stage rockets. They are designed to ignite the next stage engine immediately once their own thrust is finished. Often their labels are printed in a different color to help prevent you from using them in a typical rocket. In a multi-stage rocket, you would usually select a very long delay for your topmost engine.

Related Information:

List of motors approved for consumer use in the US

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