

Mycroft's *Pearls of Rocket Wisdom*

(Pearls? Wisdom? gag! cough! chortle! Oh, shut up.)

An Introduction to Large Model Rockets

Looking to build and fly something LTE? ("Larger Than Estes™")
Well, read on... (but remember, free advice is worth what you pay for it)

What is an LMR?

First off, LMR is an acronym for Large Model Rocket. LMRs are generally defined as weighing up to about 3 pounds and are typically launched on E, F, or G motors. LMRs are made using heavier-duty materials and stronger glues than smaller model rockets. LMRs are not necessarily harder to build than model rockets. In fact, most LMRs contain the same number of parts as a small rocket. If you have a reasonable amount of experience with model rockets, you can handle the bigger stuff. Depending on who you talk to, LMRs may also be called "medium power" or "high power-lite". (LTE is my own invention.)

How are LMRs different than model rockets?

Size & Weight. Model rockets are defined as weighing less than a pound and (typically) using E or smaller engines. LMRs may weigh up to 3 pounds, be four inches (or more) in diameter, 5 feet (or more) in height, and use engines up through H. There is some overlap – the two categories aren't rigidly defined. (Well, except by the FAA.)

Materials. LMRs use heavier materials than model rockets. LMR body tubing may be a thick-wall cardboard, phenolic (a paper that is impregnated with resin to make it harder and stronger), or a "plastic" polymer material. LMR nosecones are sturdier. LMR fins will usually be made of aircraft plywood or G10 (a strong, sheet fiberglass). LMRs use nylon parachutes instead of plastic. Also, the centering rings for the motor mount will often be made of aircraft plywood or composites instead of cardboard.

Construction Methods. The basic methods are similar to model rockets. Most LMRs are not built with white or yellow glue, but with 2-part epoxies. Epoxies are available with different working times. Generally, the longer the working time, the stronger the bond will be. (I recommend 15-minute as being most all-around useful.) You might also use cyanoacrylate (CA) glues. CA glues are essentially hobby-grade "super" glues. They "grab" extremely fast and are very light. While they make a strong bond, it doesn't have any "give" to it; when a CA glue joint fails, it can do so in a very sudden and brittle manner.

Engines. Generally, a LMR may use an E, F, or G size engine (or even a cluster of several engines) that contain a "composite" propellant. The main reason for the stronger, heavier materials in LMRs is because these engines have a lot more "grunt" than the smaller, black powder engines used in model rockets. For example, a G80 has over 7 times the total power and over 6 times the thrust of a D12! These engines can rip apart ("shred") rockets that aren't properly constructed!

Launching. LMRs require a sturdier launch pad and larger launch rods than model rockets. Also, the engines need a 12 volt launch system for ignition. You can buy suitable pads and launch controllers or build your own. Due to their weight, you are required to notify the FAA before you launch LMRs.

How Should I Get Started?

Sets. Aerotech sells a LMR "starter set" that contains an "Initiator" rocket, "Mantis" launch pad, and "Interlock" controller. Of course, you can buy rocket kits, pads, and controllers separately. Pads and controllers can also be built from plans available on the Internet or from rocket clubs.

Recommended Kits. Aerotech makes nice kits for those new to LMR. They are straightforward to construct, have decent instructions, look good, and fly well. Recommended Aerotech kits for the beginner include the Initiator or Arreux. Public Missiles Ltd (PML) makes a lot of nice LMR kits. Recommended LMR kits from PML include the IO, Phobos, Explorer, X-Calibur, AMRAAM 2, Small Endeavour, Tiny Pterodactyl, Bull Puppy 2.1, and Callisto. PML kits will be a little more complicated, and their instructions assume some previous LMR building experience. LOC/Precision also makes a variety of kits at good prices. Some recommendations would include the Graduator, Onyx, lil' Nuke, Weasel, or Forte. LOC instructions are not very detailed; they assume that you have a good bit of previous rocket building experience.

Engine Choices. Computer simulation of your rocket flights will allow you to choose appropriate motor types and delay lengths. Your first LMR launch is quite an experience. Most people are startled by the smoke, visible flame, noise, and by just how astonishingly high their rocket just flew.

(This one-page document is obviously not a comprehensive guide to LMR's or rocketry in general. Mentally insert standard disclaimer here. Author is not responsible for your ~~idioty~~, err, mistakes – no matter how extraordinary. Brands and products are listed here solely for example purposes. Said use should not be construed to constitute an endorsement by the author.)