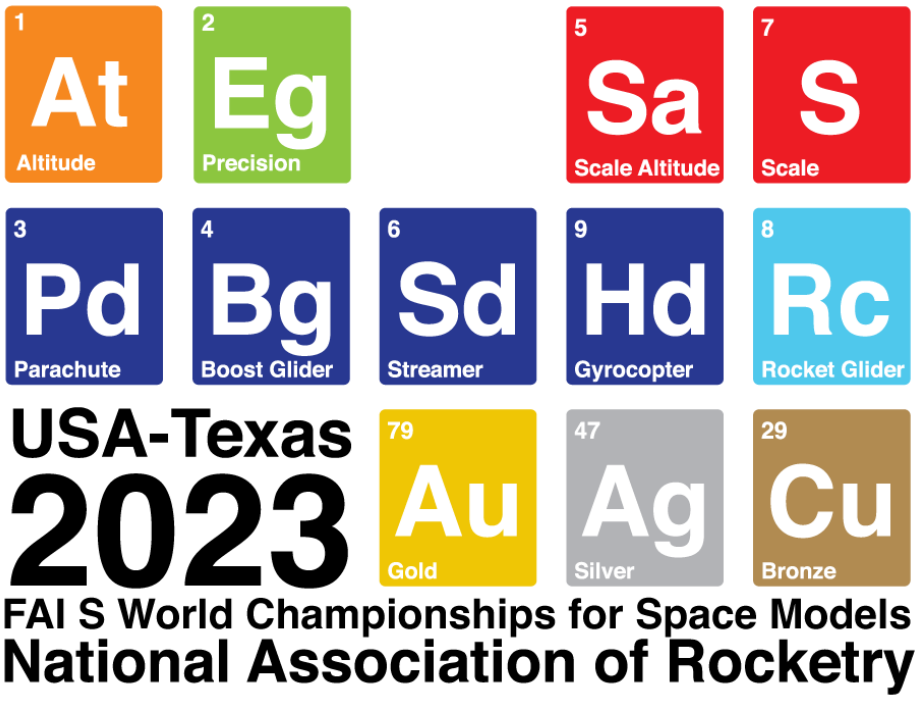
Motor Information Appendix
2023 S FAI World Championships for Space Models
Common Motor Source (CMS)



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The 2023 World Championships for Space Models will be the first to implement the Common Motor Supply (CMS), which simply means that all competitors will be using rocket motors from a single, common source. The Common Motor Supply will be administered as defined in paragraphs 3.10.1 and 3.10.3 of the Space Models Sporting Code.

All motors used in this Championship must be legal and certified for use, transport, and sale in the United States. To simplify the challenges traditionally associated with motor transport to space modeling events, the organizers will provide all motors to be used by competitors at this World Championships. This will be a change to the traditional World Championships paradigm. By removing the burden of motor transport from the participating teams, this will be an exciting, efficient, equitable, and safe event. Only motors provided by the organizers may be used at this Championships.

Do not attempt to bring your own motors to the World Championships! They cannot be legally transported on passenger aircraft, and they cannot legally be used at the World Championships! If you have specific questions concerning motors please contact Motor Director Matt Steele. (email: mattmsteele@gmail.com)

US Rocket Motor Types

Rocket motors certified by the National Association of Rocketry generally fall into two broad categories, black powder and composite.

Black powder motors suitable for space models are produced by Estes Industries, and are available in D impulse and below. For the 2023 World Championships, we will be using black powder motors exclusively for S1, S3, S4, S5, S6, and S9. Estes black powder motors are very easy to ignite using the igniters supplied with the motors. Delay times on black powder motors cannot be adjusted, nor can the delay charge be reduced or augmented. 6 volt ignition systems are generally adequate for ignition of single black powder motors, and work well with the piston systems typically used by FAI competitors.

Composite motors are produced by Aerotech. These motors will be used for S8 and will also be available for S2/P and S7 fliers who choose to use them. Like black powder motors, these are easy to ignite, but greater care must be taken with igniter placement as the head of the igniter must be placed as far as possible into the motor grain, against the delay grain. 12 volt ignition systems are recommended for composite motors.

Delays and Ejection Charges

Ejection charge times are fixed and cannot be changed. Do not try to modify the delay time on any motor, as this would be a violation of the National Association of Rocketry Safety Code.

Please note that the delay charges supplied with US rocket motors tend to be stronger than the standard charges supplied with European motors. You should plan for this by making your airframes more robust.

Staging, Clustering, and S7 Motors

Staging Estes black powder motors is easy and reliable. Typical FAI practice should yield good results with these motors. Staging Aerotech composite motors is not possible without , electronic ignition of the upper stage motors. We do not recommend the use of composite motors in upper stage applications.

Black powder motors are easy to cluster if necessary for your S7 model, although the use of 12v ignition systems is recommended for these applications. We do not recommend clustering composite motors, or combinations of black powder and composite motors.

S2/P Motors

Both black powder and composite motor options will be available for the S2/P event. We strongly recommend the use of single composite motors for S2/P, but recognize that availability issues may cause some competitors to choose a clustered black powder motor solution.

S8 Motors

The Junior S8 event will use Aerotech single use D2.3-PT motors, while the Senior S8E/P event will use Aerotech single use E6-PT motors. The reloadable equivalents of these motors are fine for practice flights if legal in your country and in the USA, but they are not legal for the WSMC.

Motor Costs

The fees for motors used for S1, S3, S4, S5, S6, and S9 and practice flights for these events are included in the contest fee. Motors used for S2/P, S7, and S8 will be subject to an additional charge. The price list and order form for S2/P, S7, and S8 will be published concurrent with Bulletin 2.

Motor Impound

Consistent with previous World Championships procedures, motors for S1, S3, S4, S5, S6, S8 and S9 will be impounded on the range in motor boxes, and will be available to competitors during practice and competition periods. Motors for S2/P and S7 will not be impounded. Any motors ordered for S2/P and S7 will be available for pickup at team registration.

Igniters and Plugs

All motors will be supplied with approved igniters. Estes motors use a retaining plug to hold the igniter in place. Aerotech igniters are supplied with a cap or elastic band for igniter retention.

Motor Data

In early spring 2023, the actual batches of the motors for the Championships will be tested by the NAR Standards and Testing team. This data will be provided in the Contest Bulletin and published on the event website for reference.

Guidance

We recognize that participants will be using these motors for the first time, and NAR volunteers will be available on the range throughout the week to answer questions about the successful use of these products. We strongly encourage you to seek out and use the guidance from these experienced flyers, especially with regard to the use of composite motors.

Motor Transport

DO NOT attempt to transport motors to the meet or any unused motors back home! Rocket motors and igniters of any type may not be legally be carried on commercial passenger aircraft, and transporting them via freight carriers is a very complex and expensive process! Violators are subject to large fines and possible prison time. If you have unused motors at the end of competition, please return them to the contest organizers.

Sources for motors outside the USA

Current international shipping laws prohibit the transport of model rocket motors that are not certified under the provisions of UN Hazard Class 1.4. Both Aerotech and Estes motors are UN certified 1.4S and are CE certified. The following dealers can legally import motors to Europe:

Aerotech European importer and dealer
Switzerland
Spacetec GmbH
Neugutstr. 10
CH - 8102 Oberengstringen
www.Spacetecrocketry.com
info@spacetecrocketry.com

Aerotech dealers
Germany
Space Rocket Technology UG
Gärdesstraße 59
D - 28755 Bremen
info@spacerockettechnology.de

Italy
Sierrafox Hobbies (also Estes)
Via Massarenti 15
I - 20148 Milano
sierrafox@sierrafoxhobbies.com

United Kingdom
Wizard Rockets
Dauntsey, Wiltshire SN15 4HN
http://wizardrockets.co.uk/
contact@wizardrockets.co.uk

Estes: www.astramodel.cz

Please note that these motors may not be sent legally by mail or parcel services in most countries in Europe. In most of the cases pick up is the only commercially feasible means of delivery.

Additional motor information is available at:

Aerotech: https://aerotech-rocketry.com/

Estes: https://estesrockets.com/

Data and links to thrust curves for each motor are presented on the following pages.

Igniters are supplied with all motors.

Estes motors with a -0 delay are intended to be used as booster motors

Event	Manufacturer	Designation (link)	Delay Times (sec)	Propellant Type
S1A	Estes	A3	2, 4, 6	Black Powder
S1B (booster), S5B (booster)	Estes	A10	0	Black Powder
S1B (sustainer), S5B (sustainer)	Estes	A3	2, 4, 6	Black Powder
S2/P	Estes	D12	0, 3, 5, 7	Black Powder
S2/P	Aerotech	E20	4, 7	Composite
S2/P	Aerotech	E30	4, 7	Composite
S2/P	Aerotech	F44	4, 8	Composite
S2/P	Aerotech	F20	4, 7	Composite
S2/P	Aerotech	F42	4, 7	Composite
S2/P	Aerotech	F52	5, 8	Composite
S2/P	Aerotech	F67	4, 6, 9	Composite
S3A	Estes	A3	2, 4, 6	Black Powder
S4A	Estes	A3	2, 4	Black Powder
S5B (booster, sustainer)	Estes	A8	0, 3, 5	Black Powder
S5B (single stage), S5C (booster, sustainer)	Estes	B6	0, 2, 4, 6	Black Powder
S5C (single stage)	Estes	C6	3, 5, 7	Black Powder
S6A	Estes	A3	2, 4	Black Powder
S7	Estes	1/4A3	3	Black Powder
S7	Estes	1/2A3	2, 4	Black Powder
S7	Estes	A3	4	Black Powder
S7	Estes	A10	0, 3	Black Powder
S7	Estes	A8	3	Black Powder
S7	Estes	B6	0, 2, 4, 6	Black Powder
S7	Estes	C6	0, 3, 5, 7	Black Powder
S7	Estes	C11	0, 3, 5, 7	Black Powder
S7	Estes	D12	0, 3, 5, 7	Black Powder
S7	Aerotech	E20	4, 7	Composite
S7	Aerotech	E30	4, 7	Composite
S7	Aerotech	F44	4, 8	Composite
S7	Aerotech	F20	4, 7	Composite
S7	Aerotech	F42	4,8	Composite
S7	Aerotech	F67	4, 6, 9	Composite
S8D	Aerotech	D2.3	Plugged	Composite
S8E/P	Aerotech	E6	Plugged	Composite
S9A	Estes	A3	2, 4	Black Powder