

We deal in flame in our sport. This elemental force is central to what makes rocketry possible, but occasionally opens some chance of inadvertent field damage. Under optimal field conditions, like nice green grass and low winds, there is negligible risk. But seasonal dry weather, flora, and local climate effects can change the safety equation. We should never forget that fire is eager to blossom from servant to destroyer. Here's what we want to keep in mind as we have our fun.

First, a little fire science

As Zog the Caveman learned long ago, there are three things needed to create fire. First, any source of concentrated chemical energy to serve as fuel (dry wood, grass, foliage, mulch, etc.). Second, oxygen to combine with that fuel. Third, a heat source sufficient to make fuel and oxygen interact. These elements are called the "fire triangle" because without all three participants, combustion cannot occur. What keeps it going is the rapid liberation of hot combustible gasses as the fuel swiftly oxidizes. (This creates the inconvenient fourth side of the triangle, but let's overlook that!) And the reaction speed is key: the only difference between those rust spots growing on your car and a burning sparkler is the oxidization rate. I've seen breathtaking NASA video of stainless steel pipes literally blazing like fireworks when exposed to high pressure pure oxygen flow. Break the triangle by cooling the fuel below its ignition temperature or blocking the oxygen, and the flame snuffs out. Put a good amount of water on a fire or cover it over and you

Our possible trouble sources will consist of the following:

Igniters: Their name says it all. They can cause problems simply from being spit out during misfires and swinging down to ground level on long firing leads.

Exhaust products: Motor heat and sparks can travel. This is obviously true in spades for any high power "effects" propellants. Watch carefully at your next night launch and see.

Motor malfunctions: Liberated composite and black powder grains from casing failures will usually resolve before landing, but not always.

Ejection charges: Any model landing before ejection can also cause problems and must be carefully observed.

And of course, other casual social activities such as cooking, smoking, or fire eating might happen in tent areas.

Prevention steps

Again, normally we are probably the safest thing happening on a given field. That's because we take all prudent precautions. If state or local authorities declare a "Red Flag" fire danger day in your region, cancel the launch. There is no excuse to do otherwise. If conditions are less acute, you proceed at appropriate levels of caution. Only the most rigorous preparation by Alan Williams NAR 14137

The NAR range crew responds quickly to a burning rocket at NSL 2016.

and inspection procedures should be applied to each model to be flown. The other extensions of procedures are:

Launch area prep: Any dried grass, thatch, leaves, or other fuel should be raked well away from the launch zone; the resulting refuse needs to be moved well upwind and/or disposed of. I once saw a dry grass pile ignite more than twenty feet from an A-impulse contest flight. If you have water to spare, you may want to spray down the area under the launchers at intervals. Also, inspect the ground near the launchers as the day goes on. Foot traffic will probably degrade the ground cover there.

Launchers: Try to get them elevated off ground level and insulated from burnable items (with welding blankets, tarps, wet ground cloths, or pavers). Blast deflectors should be angled or designed to throw exhaust products back up so they can cool in mid-air, rather than being channeled down toward the ground. Exhaust flame impingement damage on the rocket can be controlled by supporting the model a



bit higher up the rail. A very good idea is the addition of an upward-directing lip at the deflector's edges, either by bending the deflector or adding some nonflammable material like plaster of Paris or tile grout to form a ramp structure. Large clay flowerpot saucers are relatively cheap and work well, though they're a bit fragile (the edge lip is built right in the design). In any case, modelers should carefully center the motors above the deflector, which should be realistically sized for the model at hand.

Suggested fire response supplies

While some of this should be standard equipment for every launch, prevailing conditions may warrant extra safety measures. You should always bring some combination of the following. Fire flappers or shovels. Sand buckets to bury small problems close-in. Metal (not plastic) bow rakes to remove that dry plant material. And a place to put it! And *always* have some form of extinguisher backed up with a large surplus of water.

Fire extinguishers: Ideally, you want something like the "Indian Pump" backpack system. This is a classic hand–pumped water spray tool used to fight brush fires. If approached properly, your local fire service may well loan you one or two. Commercial "Class A" water units are available that can be refilled, then recharged with any air compressor. I also used a pair of three gallon pressurized metal

garden sprayers to good effect for years. I simply bored out the nozzle tips to allow more water flow and pumped them to high pressures. They had the advantage of being lighter weight so we could get to a smoldering spot fast. However, today's garden sprayer systems commonly have plastic wands and nozzles that might melt near flames. Look for metal alternatives. My sprayers were dedicated to fire suppression; you don't want pesticide or other residues creating unknown hazards.

Remember that many extinguisher types assume indoor use against specific fire sources. You are fighting a "Class A" (wood, paper, organic cloth materials) fire. Because of wind effects inert vapor extinguishers using CO₂. Halon, or Carbon-Tetrachloride will have little effect on grass or brush fires. Soda-acid units (which combine vinegar and baking soda to produce a CO₂-liquid mixture) will have no advantage over water outdoors. Dry chemical systems will work on grass fires, but their effectiveness in this application is not high. They smother the flame with a combustion-interfering powder that must land in the right spot to work. They must also be serviced or replaced after even the smallest discharge because the powder-fouled valves let pressure leak out afterwards. So, water is your best weapon. But use anything at hand. Even a two-liter soda bottle shaken and vented at a fire is better than nothing!

To extinguish a grass fire, get there fast and water down the area at the base of the flame; that's where the fire is really happening. Wet down the entire fire area, including down wind. Don't be stingy. You want that fire dead! After it is killed, look over the area to see if any spreading has occurred. Fire is sneaky and wants to fool you. Finally, examine the incident's origin and correct the problem.

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To use the other tools:

Fire flappers are floppy sheets of rubber mounted on poles. They work by beating down the flame plume and denying the combustion point fresh air. You might find it more effective to drag the flapper along the ground to smother the fire, rather than slapping away at the flames. A flat shovelhead can have much the same effect. Care must be used to prevent burning materials from being blown forth to cause new hot

In arid regions, dirt or sand poured, raked, or shoveled onto a small fire likewise denies oxygen and snuffs the fire. Metal rakes can also be used to break up flame sources to make water more effective. The NAR Section Safety Grant program can make this equipment easy to procure, at little or no cost to your club.

If stepping in hot areas, remember that plastic athletic shoe soles can melt or catch fire themselves.

Grass fires should be fought only from the rear (up wind) or sides. An attack from down wind by untrained persons without protective gear must never be attempted.

In blowing winds, established grass and brush fires can surge forward faster than vou can run. Make sure evervone maintains situational awareness. Have specific people assigned fire watch, suppression, and fire service reporting duties. The Range Safety Officer will have command.

If flames show the slightest sign of getting away, call your fire service now! They would much rather roll up on a fire that's been killed than fight a large event because of a reluctance to call for help until it broke free.

The preceding should not be taken as saying that we are turning the nation to a wasteland of carbonized burn scars. In fact we have a good record of stewardship on our fields. This is because we always try to anticipate and control problems. But, in the rare event that things go wrong, you want to have a plan and the equipment to respond fast and right.

(Thanks to Pr. Georges Co. Maryland Station 39 Chief Pete Mellets and Instructor Tom Cusack for useful information tweaks.)

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Getting by With a Little Help From My Friends

by Terrill Willard

I went to the 2017 Team selection with a real desire to win S3A and to at least place in the top three in S6A. I have had the honor of flying S3A on the 2012 and 2014 teams. I was a distant 4th or 5th place in streamer in 2013 and it was a total surprise when I landed in Bulgaria and found that I would indeed be flying S6A there in 2014. This time I wanted to be in the top three so that my S6A participation would be "legit" in 2018. On top of doing well for the team spot, I really wanted the challenge of trying to medal in the CanAm Cup, too. To do that I would need to fly my best and focus on doing it with only two models for each event. (Of course, this added pressure, but that is half the fun of FAI flying.)

I did manage a max in round one of S3! That was a good start, but I lost the model in the process. It flew far out over the Big Icky. In round one of S6A, my newly designed streamer did not work at all. The performance (untested) was far below what I expected and the flight was only good for 56 seconds. The second round of S3 was later in the

day and I was ready right at the start. I jumped into the queue as soon as a big thermal came and, sure enough, it was a boomer. I had a second max, but the model was still going up when I last saw it at around 12 minutes. I was sure that I could pull out my third model and get in contention for the U.S. S3A team with a good flight on Sunday, but was really bummed to not be able to do it with two models and therefore qualify for the CanAm Cup medal too. I was hanging my head and walking back to the range when Kevin Johnson drove by. He asked how I was doing and I told him the good/bad news. It was then that he told me the precise location of my first S3A model. He had seen it earlier in the day. It had cleared the ponds and landed in the brush on the far side. Kevin knew the model was mine due to the color of the parachute. So I jumped in my rental car and headed out. Sure enough, the model was right where Kevin said it would be. The recovery was not easy, but it was not impossible either. I now had model number 1 for Sunday's final S3 round, a chance to make the team, and to place in the CanAm Cup!

Kevin's choice to help me out might have put himself out of the CanAm Cup medal race. We were pretty close after the first two rounds, but he chose to be a good sport and a good friend and help me out when I needed it. Boosted by the good news, I

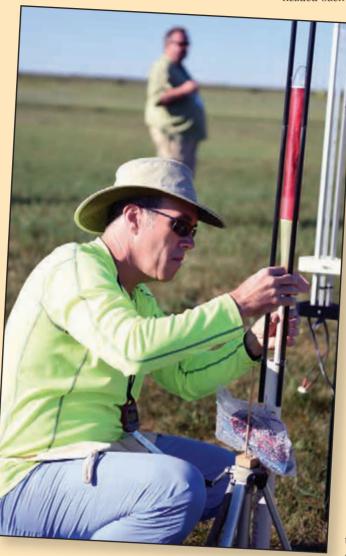
headed back to fly the second round of S6A.

I dug out a used streamer made by Jay Marsh. He had given it to me to fly in Bulgaria in 2014. I used it for one or two flights in the World Championships there. It wasn't new, but it was probably better than what I had. I waited deep into the round before finding a thermal that I liked. It paid off. My second S6A flight was 131 seconds, the best of the round! The only downside was that the model went into the nasty water and was pulled out, but the streamer and airframe were destroyed. So after two rounds I was tied for first place in S3A and in S6A.

The final round of S3A on Sunday was rough. Right as the range opened a huge area of warm air broke loose and any models in it were treated to good lift. My model was not even prepped and in the tower when that happened. I had forgotten my igniter back at the car. After what seemed like hours (but was more like 15 or 20 minutes) the air started to warm again. When the time looked right, I launched and managed the only max in the final round. I had my spot on the team for S3A and also a Gold medal for the CanAm Cup!

I knew that I had no chance to stay at the top of S6A with one of my own streamers, so I headed over with my hat in my hand to ask Jay Marsh for one of his streamers. Jay graciously offered me my pick of new or used streamers from the ones he had brought to the contest. Now, at that point, Jay was trailing behind me by 44 seconds. If he had refused, he could have easily beaten me for a medal and a spot on the team. He knew this, but chose to be generous. He gave me a new streamer and I was back in the running! Jay and I chose to launch in the same thermal. We both had great flights and both made the S6A team! My second good flight was enough for me to secure the gold medal in S6A too.

It will be a pleasure to go back to a world championship knowing the kindness and generosity of my teammates. I hope I can repay these two guys when we fly in Poland in 2018. There is a chance I would have made the team in S3A, but without Kevin and Jay, I would not have two Cup medals and I would not have made the team for S6A.





S5B (B Scale Altitude for the Juniors), S5C (C. Scale Altitude for the Seniors), S6A (A. Streamer Duration), S7 (Scale), S8E-P (Radio Control Rocket Glide with Precision Landing), and S9A (A Helicopter Duration). Except for the S8E-P, each duration event consists of three rounds, each with a maximum time (max) that can be recorded for the round. The sum of the three flights is added up to determine the winner. The major difference between the Can-Am Cup flights and the flyoffs was that, for U.S. Team Selection, contestants could use a third model in the duration events if their first two were lost. The reason behind this is that, at a World Championships, the U.S. provides a recovery team and fliers do not worry about recovery. The change made for some interesting challenges

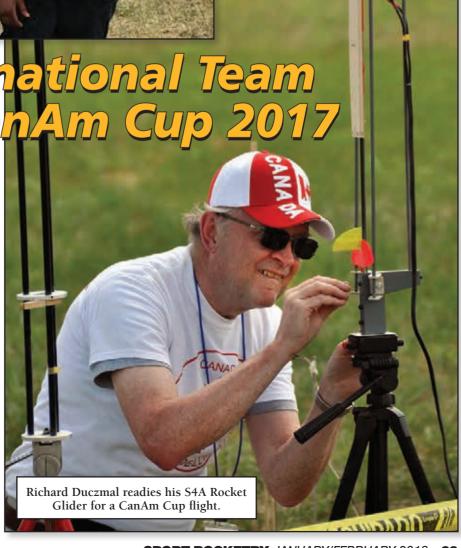
U.S. Interna Flyoffs/CanAm

by Matt Steele

The weekend before NARAM a competitive flyoff was held to determine spots for the 2018 U.S. World Spacemodeling team. Sponsored by the Federation Aeronautique Internationale (FAI), the 2018 meet will be held in late August in Poland.

This year, the flyoffs were flown with a twist—the meet was flown as a full FAI Cup contest. The idea was to create a spirit of "Practice as you fly, fly as you practice." Coming off the heels of a successful 2016 World Championships team in Ukraine, and with the 2018 meet planned for Poland, the CanAm Cup/Flyoffs drew an alltime high number of 53 contestants. This was the largest FAI International meet held in the U.S., besides the two previous World Championships held in the U.S. (1980 and 1992).

The contest events were S1B (B Altitude), S2P (Precision Eggloft), S3A (A Parachute Duration), S4A (A Rocket Glide),







streamlined airframes and a pull-string piston clamp release mechanism.

Kevin Kuczek used

eryone flew A10-0T boosters and 1/2A3-4T sustainers (A3-4T upper stage motors would eject long before apogee and flight altitude would be a function of delay time accuracy rather than model performance, and we want to determine model performance).

In S1B, current World Champion Dr. Bob Kreutz took the top spot for the Seniors (347m). Dr. Bob said that the key to all of his success was "going straight up," which is indeed true; off-axis flights kill altitude. He used both a piston and a tower on all of his flights. In second place (324m) was Trip Barber, a veteran of many S1 teams. His two-stage design was identical to the design he used in the last

WSMC, with a singlepiece molded fiberglass upper stage that used rear ejection. The lower stage used an 8-degree taper on the front end, with a piston launch. In third place was Emma Kristal (303m), a veteran of previous Junior S1 teams. Emma's colorful models edged out Matt Steele (293m) and her father, Steve Kristal (236m). Of note, Mike Nowak's model flown two days after the end of the contest, and his altitude would have been tops of the meet,

for the check in and data teams, but worked smoothly overall.

Mike Nowak acted as the Contest Director for both the flyoffs and the CanAm Cup. He was helped by an able staff of Katie Steele

(Model Check-in), Nick Nowak (Launch Control), Jennifer Ash Poole (Data), and Chris Kidwell (Data). Range Safety Officers included Rod Schafer, Matt Steele, James Duffy, Brian Guzek, Bob Ferrante, and Jim Filler. We were fortunate enough to have our good Canadian friends joining us, and the Spanish were represented by Esther Roura, the new Mrs. Kevin Johnson.

This was the most competitive flyoff yet. The experienced U.S. fliers just keep getting better and better. As a testament to how tough it was, no Senior qualified for more than two events. That's the first time that has ever happened.

The flat Michigan field was great for the meet, and support from the local club was fantastic. For the duration events, Saturday morning's weather started off being quite challenging with light wind out of the northeast. Overcast skies retarded the thermal energy, but those models that did hook up ended up in or over the nastiest part of the sewage treatment plant (also known as the "Big Icky"). The afternoon improved with winds becoming easterly, keeping models out of the sewage ponds. Sunday morning was beautiful with very low winds and clear skies.

S1B (B Altitude)

S1 is the event designation for the FAI Altitude event. In this event, the models have to be 500mm long, have 50% of their length be 40mm in diameter, and upper stages can be no smaller that 18mm in diameter. To be competitive, models need to be flown with two stages, with the motors for the stages separated by 10" or more. Using electronic altimeters to determine altitude, the highest altitude on a single flight wins. For the meet, ev-





with 355 meters!

In the Junior division, both Van Milligan girls had altimeter malfunctions on their first flights, likely due to prep errors. Allison's altimeter only read 8m and Ashley's read 34m. Allison doesn't like the event because it has a lot of prep work, so she just took the score "as is." Because there were only three junior entries in the event, that poor score was enough to qualify for the team. Ashley, being a go-getter, wanted to fly again, and this time she had a great flight and the altimeter worked just fine to win the event with 279m. Trevor Harrison joined the girls by taking second place with 108m flight.

S2P Precision Payload

S2P is the FAI version of the Team America Rocketry Challenge event, Contestants try and fly a model to 300m and 60-second flight times without breaking an egg. The real fun is there are three flights, and the egg is not checked until after the third flight. So, a contestant can have a great altitude and time, only to be disqualified at the end of the event with a cracked egg. These models are fun to watch, as they are powered by E or F engines.

Matt Steele, fresh off of a team gold medal at the World Championships, took first place with three near perfect flights. including a 2 in the second round. Matt said he designed his model after serving as Chief Timer at the TARC finals, where he got to watch over 200 flights (See, it pays to volunteer!). Wolfram von Kiparski took second place; his strategy was to use a lightweight egglofter that was rugged enough to survive multiple flights. He used plenty of padding around the egg, and just-enough motor to reliably do the job (an AeroTech Econojet E20-7W). He used OpenRocket to develop his egglofter design, and made "lots of practice flights; practice pays off." Steve Kristal was third in a model similar to what his daughter (and current World Champion) Emma flew; Emma herself ran into some uneven flights and did not place. The hard luck story of the event goes to Trip Barber, who lost his model (and the expensive altimeter) on his first flight. Fortunately, four days later his model was returned!

Allison Van Milligan (80 points, using an Apogee kit) edged out Stoil Avramov (176 points) and her sister Ashley (208 points) to take top honors in the Junior division.

S3A (A Parachute **Duration**)

S3A is the event designation for the FAI A Parachute Duration event. It is flown in three rounds, with a 300 second max. The models must be at least 500 mm long, and a minimum diameter of 40mm for at least 50% of length. They feature huge 36" Mylar parachutes that try and get a 5-minute max time, and are spectacular to watch. It's really neat to see the sky filled with five or six of these models, all at different altitudes, usually in a thermal. These models are flown on A3-4T motors.

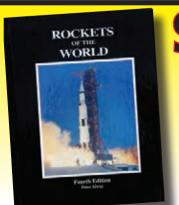
Terrill Willard scored a triple max to win the Senior event (see sidebar). Close behind for a flyoffs position was Trip Barber, whose third flight with a third model was just short of a max, followed by Nick Rivecchio.

For the CanAm Cup (only using two models), Senior second place was taken by Betty Dall, with third place going to Canadian Peter Cook.

The Juniors were dominated by Allison Van Milligan, who was the only Junior to record a max. Stoil Avramov took second, followed by Trevor Harrison. Stoil took the CanAm Cup gold because the Van Milligan sisters chose not to fly the FAI event.

S4A (A Rocket Glide)

S4A is the event designation for the FAI A Rocket Glide event. It is similar to the NAR Rocket Glider event, where no jettisoned parts are permitted—in other words, everything that goes up must come back gliding. A max is 180 seconds in this event. The state of the art in this event are



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slick swing wings that flop the wing tips out. They look like a Rube Goldberg contraption, but when they work, they transform into a sleek, high aspect ratio glider that goes on and on.

For the S4 event, the Van Milligan sisters used the Apogee Cirrus Breeze glider kit, which is a slide wing design. The wing is smaller than what other competitors were using, but they were pretty confident that they would at least get a qualified flight. And they did, getting flights good enough to place Allison first and Ashley third for the flyoffs. Zach Stenberg used a swing/flopwing model to place just behind Allison. Stoil Avramov won the Can-Am Cup, followed by Trevor Leggette and Trevor Harrison.

Keith Vinyard won the Senior event, using a fixed wing, fixed pod Hummingbird. On Keith's model, the wing flaps move to transition the model from boost to glide. Keith's model was flown off of a piston, and had a dethermalizer to help recover the model. Peter Cook took second in the FAI meet with a swing/flop wing, followed by Kevin Kuczek. For the flyoffs, Don Carson took second with a swing/flop wing, followed by Rod Schafer with a slide wing glider.

S5B/S5C (B/C Scale Altitude)

S5 is the event designation for the FAI Scale Altitude event. S5 Scale Altitude is a challenging event that combines the points achieved for static craftsmanship on a scale model with the altitude achieved by the model in flight. Juniors fly B powered models, and Seniors fly C power. Recent rule changes have prompted a wide variety of prototypes to be entered.

Jay Marsh dominated the event, winning both static (527 points) and altitude (463 m) portions with his Mistral S1 missile. Second place went to a very clean Black Brant III by James Duffy, who flew to one meter (462m) behind Jay in altitude. Third place went to current World Champion Matt Steele with his Black Brant IV (445m). Just missing a spot was Jim Filler and his Arcas (438m). Former S5 gold medal winner Dr. Bob Kreutz flew a very detailed Hydac, but didn't get much altitude out of the model (365m). His tower got knocked over on his first flight, crimping the Hydac, but it was repaired with tape and flown twice.

The Junior division feature some new faces for FAI competition. Chari Houston

and Bryce Stevens both flew Arcas models to the top two spots. Third place was taken by Trevor Harrison's Falcon 9. It was refreshing to see new modelers fly well.

S6A (A Streamer **Duration**)

S6A is the event designation for the FAI A Streamer Duration event. It is flown in three rounds, with a 180 second max. The

models must be at least 500 mm long, and a minimum diameter of 40mm for at least 50% of length. Most of the modelers use Mylar streamers in this event.

Despite apparent simplicity of the event, it is one of the hardest to get consistent results and maxes. The models for these events are ultralightweight and feature a variety of streamer materials and folding methods, which each flier having a preferred event.

Terrill Willard pulled off a unique double, winning the gold medal for the Can-Am Cup in both S3A and S6A. His streamer score was 346 seconds. Emma Kristal was close behind with a third round max that made her score 342 seconds. Jay Marsh's ultra-lightweight model took third place

Allison Van Milligan won the S6A event with solid flights in the first two rounds and a great third round flight for a total score of 262 seconds. Just seconds back were Stoil Avramov (234 sec) and Ashley Van Milligan (215 sec).

S7 Scale

with 311 seconds.

S7 is the event designation for the FAI Scale event. S7 is the most challenging of the spacemodeling events held on the international level. Not only must the models be precise replicas with enormous amounts of detail and flawless workmanship, but they also must be mechanically complex enough to perform many "special effects" during flight in order to score high flight points.

Chris Flanigan, an S7 veteran, flew his 1/48 scale, three staged, clustered Saturn 1B to first place in the Senior division. Chris's model takes advantage of the complicated FAI scale rules to get the maximum amount of difficulty points. It is also very impressive to see in flight, as the clustered model takes off in a cloud of smoke,

> stages and deploys its second stage foldout fins, and then stages again, before everything returns to the ground in a plethora of parachutes.

Mac McReynolds flew a large and impressive model of the Japanese M-3C to take second place. His colorful silver and bright orange model notched a perfect cluster flight. James Duffy took third place with a large Bumper Wac model, roughly the size of the old Estes V-2 kit. James staged the Wac for a spectacular and very high flight. Mike Nowak was fourth

with a 1/87(HO Scale) Saturn V that flew on a five-engine cluster and staged. Trevor Harrison flew a SpaceX Falcon 9 to take first in the Junior Division.



Rocket Glider, which transitions to glide by activating wing flaps.

S8E/P (E Radio Control Rocket Glider)

S8E/P is the event designation for the FAI E Radio Controlled Rocket Glider and Precision Landing event. Seniors fly S8E/P, with E motors, precision time (360 seconds) and landing, four rounds, normalized score per round, and an additional flyoff round for the top five fliers.

Sunday afternoon, when the event was flown, the wind and thermal activity strengthened to make for challenging S8 soaring conditions. Both lift and sink were abundant to bring out the best in the pilots, and make it the hands on, interactive fun event that it is.

CANAM CUP WINNERS

	A Open Internatio	nal Ev	_
Juni			Total
1	Avramov, Stoil	USA	531
2	Harrison, Trevor	USA	286
3	Leggette, Trevor	USA	27
Sen	iors:		
1	Willard, Terrill	USA	900
2	Dall, Betty	USA	641
3	Cook, Peter	CAN	625
	A World Cup Ever		023
Juni	-		Total
1	Avramov, Stoil	USA	62
2	Leggette, Trevor	USA	41
3	Harrison, Trevor	USA	27
_	iors:	0011	21
1	Vinyard, Keith	USA	417
2	Cook, Peter	CAN	335
3	Kuczek, Kevin	USA	233
)	Nuczek, Nevili	UJA	233
S-6	A World Cup Ever	nt	
Juni		I IC 4	Total
1	Avramov, Stoil	USA	234
2	Harrison, Trevor	USA	175
3	Leggette, Trevor	USA	37
Sen	iors:		
1	Willard, Terrill	USA	346
2	Kristal, Emma	USA	342
3	Marsh, Jay	USA	311
4	Vinyard, Keith	USA	311
	A World Cup Ever	nt	
Juni	iors:		Total
1	Avramov, Stoil	USA	184
2	Leggette, Trevor	USA	122
3	Harrison, Trevor	USA	24
Sen	iors:		
1	Vinyard, Keith	USA	467
2	Humphrey, Steve	USA	391
3	O'Bryan, David	USA	376
	•		510
	EP World Cup Eve	ent	Total
1	Woebkenberg, Ryar	nUSA	4933
2	O'Bryan, David	USA	4569
3	Guzek, Brian	USA	4074
S-2	P Open Internation	nal Ev	ent
Juni			Total
1	Avramov, Stoil	USA	167
2	Harrison, Trevor	USA	364
	iors:	0011	301
1	Matt Steele	USA	27
2			52
3	Wolfram von Kiparski Steve Kristal	USA	84
)	Sieve Klistal	USA	01

Ryan Woekenberg won the event, flying the same model he flew in Serbia in 2010. It is a Bob Parks designed Raven 11 that he built with three servos (rudder, elevator, flaps). Ryan made it a point to launch us early as possible in case of a misfire. He was always ready to go as soon as working time started and was ready to launch unless there was some obvious bad air or something (there wasn't). On two of his flights, he got into a bit of trouble and had to work the air low (that isn't a great strategy). In the fourth round, he had to work air downwind a bit more than he would have liked, but did an OK job of pushing back to the landing spot. He had good landings in all five rounds. The final round was the only round he was short on the time, although everyone in the flyoffs was short on the time.

Matt Berk dusted off his model from the last WSMC and won three rounds with perfect 1000 point scores, only to get into trouble in the final round and slip to second place. Dave O'Brien strung together consistently good flights to place third, and was closely followed by Brian Guzek. Brian had two great rounds, but his fourth round score cost him dearly.

Veteran S8 flier George Gassaway ran into troubles when he had an E6 reload cato. The cato broke off the motor pod, forcing a fast fix with CA. He took off with at about 4.5 minutes left, so he had to forcibly land at less than 4.5 minutes, also blowing the landing, and putting him out of the running.

S9A (A Helicopter Duration)

S9A is the event designation for the FAI A Gyrocopter (Helicopter) Duration event. It is flown in three rounds, with a 180 second max. The models must be at least 500 mm long, and a minimum diameter of 40mm for at least 50% of length. S9A models are fun

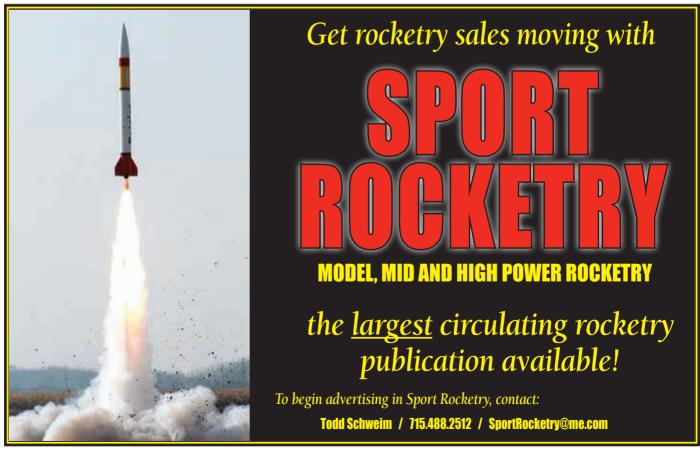


to watch. They feature internal rotors that pop out at ejection, then spin up to create lift. The model dimensions are similar to the other "tube" duration models, though the boat tails tend to be shorter to allow for longer blades. They are also flown on A3-4T motors.

For the Juniors, the Van Milligan sisters used the same design they used in Ukraine, a variation of the Apogee kit. The only difference was the blades were twisted a little more in order to induce them to spin up faster. The additional twist seemed to work fine, and the girls took the top two spots, with Ashley beating her older sister Allison. Stoil Avramov took third.

Jon Stenberg took the top spot in Senior S9 with a flop-rotor model, flown with a piston/tower combination. He got two maxes and a near max to beat the competition.

Keith Vinyard was not far behind Jon, using a model with three curled blades that was first developed for the 2008 WSMC. Keith flew off a "naked" (i.e., no tower) piston and managed to max one flight. Steve Humphrey also managed to score one max to place third for the flyoffs.



COMPREHENSIVE CAR/NAR/TIRA ROCKET MOTOR CERTIFICATION LIST

As a service to NAR members, the NAR Standards and Testing Committee (S&T) publishes a list of all rocket motors certified for use at NAR launches. As the NAR, the Tripoli Rocketry Association (TRA), and the Canadian Association of Rocketry (CAR) maintain a reciprocal certification policy, motors certified by all organizations are included in this list. Members of all organizations may use motors certified by any organization as long as the motor has been approved for transportation in your country (DOT certification in the USA).

Additions, deletions, and other changes to the list of NAR-certified motors will be published in NAR iournals as they become available. They will also be published on the NAR web site (http://www.nar.org).

Individuals, such as Contest Directors, requiring the very latest list of NAR certified motors may contact Ed Pattison-Gordon via electronic mail at <rdedwa@comcast.net>. Other questions may also be directed to S&T Co-chair Jack Kane at 23 Bungay Road, Mansfield, MA 02048. Questions regarding Tripoli certified motors should be directed to Paul Holmes, Chairperson, Tripoli Motor Test Committee. Questions regarding CAR certified motors should be directed to André Choquette, Chairperson, CAR Motor Testing.

Order the S&T Motor Data Sheets from NARTS if you desire additional information. This report consists of data sheets for each motor currently certified by NAR S&T. Each data sheet contains a thrust curve together with values from test firings, including measured average thrust and total impulse, plus 32 data points for use in altitude simulation computer programs.

Denotes single-use motor

Key to Notes

- Denotes single-use motor
- Denotes a reloadable motor certified R only with the manufacturer supplied casing, closures, nozzle, and propellant
- Н Denotes a hybrid motor
- Denotes a tribrid motor T
- Denotes certified for NAR contest use
- ! Denotes a sparky motor
- а Certified for use in Animal hardware
- Treat motor as a high power motor regardless of its total impulse
- N/A Information not provided by certifying group
- in the Propel. Mass column indicates CC the volume of nitrous in a hybrid motor
- in the Propel. Mass column indicates the volume of alcohol in a tribid motor

No	Designation otes	Mfg.	Size	Total Impulse	Propel. Mass	Cert. Group
			(mm)	(N-sec.)	(grams)	
S	1/8A.2 (MicroMaxx)-1	Quest	6 x 26	0.135	0.4	NAR
S*	1/8A.5 (MicroMaxxII)-1,NE	Quest	6 x 26	0.22	0.5	NAR
S*	1/4A3T-3	Estes	13 x 45	0.62	0.8	NAR
S*	1/2A3T-2,4	Estes	13 x 45	1.25	2	NAR
S*	1/2A6-2	Estes	18 x 70	1.25	2.6	NAR
S S*	A3T-2,4 A3T-4	Quest Estes	13 x 55 13 x 45	1.71 2.5	3.6 3.3	NAR NAR
S*	A6-4	Quest	18 x 70	2.5	3.5	NAR
S* S* S* S* S* S*	A6-4 A8-0 A8-3 A8-3,5 A10T-0 A10T-3,P	Quest Estes Quest Estes Estes Estes Estes	18 x 70 18 x 70 18 x 70 18 x 70 13 x 45 13 x 45	2.3 2.15 1.86 2.5 1.88 2.5	3.5 3.84 3.6 3.3 3.57 3.8	NAR NAR NAR NAR NAR
S* S S* S*	B4-2,4 B4-4 B6-0 B6-0,4	Estes Quest Estes Quest	18 x 70 18 x 70 18 x 70 18 x 70	5 3.84 4.9 5	6 10.4 5.6 6.5	NAR NAR NAR
S*	B6-2	Quest	18 x 70	5	6.5	NAR
S* S*	B6-2,4,6 B6-4	Estes Quest	18 x 70 18 x 70	5 4.85	5.6 6.5	NAR NAR
R* S*	C3.4-P C6-0	Aerotech Quest	18 x 72 18 x 70	9.22 8.8	5.2 11	NAR NAR
S*	C6-0,3,5,7	Estes	18 x 70	9	10.8	NAR
S*	C6-3,5	Quest	18 x 70	8.5	11	NAR
S*	C6-3,5	Quest	18 x 70	8.76	12	NAR
S* S*	C11-0,7 C11-3,5	Estes Estes	24 x 70 24 x 70	9 9	12 12	nar Nar
R*	D2.3-P	Aerotech	18 x 72	17.21	10.7	NAR
S S*	D5-4,6 D5-P	Quest Quest	20 x 96 20 x 88	17.61 19.6	24 25	NAR NAR
R*	D7-RC	Aerotech	24 x 70	20	10.5	NAR

Abbreviation Aerotech Alpha Animal Apogee Cesaroni Contrail Estes Gorilla Hypertek Kosdon/AT Loki PML Propulsion Quest RATTWorks	Company AeroTech, ISP, or Dr Rocket Alpha Hybrid Rocketry, LLC Animal Motor Works Apogee Components Cesaroni Technology Inc. Contrail Rockets LLC Estes Industries Gorilla Motor Hypertek Kosdon by AeroTech Loki Research Public Missiles Ltd. Propulsion Polymers Quest Aerospace R.A.T.T. Works Precision Rocket Motors
Quest	Quest Aerospace
Roadrunner Sky Ripper WCH	Rocket Motors RoadRunner Rocketry Sky Ripper Systems West Coast Hybrids

No	Designation otes	Mrg.	(mm)	Inpulse (N-sec.)	Mass (grams)	Group
S	D8-0,3,5	Quest	24 x 70	18.59	22	NAR
R*	D9-4,7	Aerotech	24 x 70	20	10.1	NAR
S*	D10-3,5,7	Aerotech	18 x 70	18.3	9.8	NAR
S*	D10-3,5,7	Apogee	18 x 70	18.3	9.8	NAR
S*	D11-P	Estes	24 x 70	18	24.5	NAR
S*	D12-0,3,5,7	Estes	24 x 70	17	21.1	NAR
R*	D13-4,7,10	Aerotech	18 x 70	20	9.8	NAR
R*	D15-4,6	Aerotech	24 x 70	20	8.9	NAR
S*	D21-4,7	Aerotech	18 x 70	20	9.6	NAR
R*	D24-4,7	Aerotech	18 x 70	18.5	8.8	NAR
	,	710/0100/	10 % 10	10.0		
S*	E6-4,6,8,P	Apogee	24 x 70	37.8	22	NAR
R*	E6-RC	Aerotech	24 x 70	40	21.5	NAR
R*	E7-RC	Aerotech	24 x 70	30	17.1	NAR
S	E9-0	Estes	24 x 95	28.5	35.8	NAR
S*	E9-4,6,8,P	Estes	24 x 95	28.5	35.8	NAR
R*	E11J-3	Aerotech	24 x 70	31.7	25	NAR
S*	E12-0,4,6,8	Estes	24 x 95	27.24	35.9	NAR
R*	E12J-RC	Aerotech	24 x 70	36	30.3	NAR
S*	E15-4,7	Aerotech	24 x 70	35	16.2	NAR
S*	E15W-P	Aerotech	24 x 70	40	20.1	NAR
S*	E16-0,4,6,8	Estes	29 x 114	33.38	40	NAR
R*	E16-4,7	Aerotech	29 x 124	40	19	NAR
R*	E18-4,8	Aerotech	24 x 70	39	20.7	NAR
S*	E20W-4,7,10	Aerotech	24 x 65	35	16.2	NAR
R*	E22SS-13A	Cesaroni	24 x 69	24.2	13.4	CAR
R*	E23-5,8	Aerotech	29 x 124	37	17.4	NAR
S	E25R-4.7.P	Roadrunner	29 x 76	38.7	20.6	TRA
R*	E28-4,7	Aerotech	24 x 70	40	18.4	NAR
S*	E30-4,7	Aerotech	24 x 70	33.6	17.8	NAR
S*	E30-4,7	Estes	24 x 70	33.6	17.8	NAR
R*	E31WT-15A	Cesaroni	24 x 69	26.1	11.2	CAR
R*	E75VM-17A	Cesaroni	24 x 69	24.8	10.4	CAR
S*	F10.460	Anogon	29 x 93	74.3	40	NAR
R*	F10-4,6,8 F12-2,5	Apogee Aerotech	24 x 70	45	30	NAR
R*	F13-RC	Aerotech	32 x 107	63	32.3	NAR
S*	F15-0,4,6,8	Estes	29 x 114	49.61	60	NAR
R*	F16-RC	Aerotech	32 x 107	80	62.5	NAR
S*	F20-4,7 F21W-4.6.8	Aerotech Aerotech	29 x 83 24 x 98	51.75 55	30 30	NAR TRA
	,-,-	Aerotech				
R*	,		29 x 124	65 EC	46.3	NAR
S*	F23FJ-4,7	Aerotech	29 x 73	56	32	NAR
S*	F23FJ-4,7	Aerotech	29 x 83	41.2	30	NAR
R*	F23SK-RC	Aerotech	32 x 107	70	37.8	NAR
R*	F24-4,7	Aerotech	24 x 70	50	19	NAR
S*		Aerotech	29 x 98	80	35.6	NAR
S*		Estes	29 x 98	62.2	43.1	NAR
S*	,	Aerotech	29 x 98	62.2	43.1	NAR
S*		Aerotech	29 x 83	49.6	28.4	NAR
R*		Cesaroni	29 x 98	54.8	30.9	CAR
S*		Aerotech	24 x 90	47	31.2	NAR
R*		Cesaroni	24 x 133	73.1	40	CAR
R*		Cesaroni	29 x 98	55.5	25.7	CAR
R*	F32WH-12A	Cesaroni	29 x 98	52.8	29.9	CAR
S*		Aerotech	24 x 90	56.9	25.8	NAR
R*		Aerotech	24 x 95	57.1	30	NAR
S	F35-6,10	Roadrunner	29 x 112	76.5	40.1	NAR
R*	F36SS-11A	Cesaroni	29 x 98	41.2	29.5	CAR
R*	F36BS-14A	Cesaroni	29 x 98	51.5	25.6	CAR
R*	F37-6,10,14	Aerotech	29 x 99	50	28.2	NAR
R*	F39-3,6	Aerotech	24 x 70	50	22.7	NAR
R*	F40-4,7,10	Aerotech	29 x 124	80	40	NAR
S*		Aerotech	29 x 83	52.9	27	NAR
S*		Aerotech	24 x 70	41.46	19.7	NAR

Size

Total

Designation Notes	Mfg.	Size (mm)	Total Impulse (N-sec.)	Propel. Mass (grams)	Cert. Group	Desi Notes	gnation	Mfg.	Size (mm)	Total Impulse (N-sec.)	Propel. Mass (grams)	Cert. Group		Designation Notes	Mfg.	Size (mm)	Impulse	Propel. Mass (grams)	Cert. Group
S F45R-5,8,P	Roadrunner	29 x 93	62.3	30	TRA		684GR-10A	Cesaroni	24 x 228	131	77.3	CAR		R H151RL-15A	Cesaroni	29 x 231	207.2	109.1	CAR
R! (HP) F50SK-13A	Cesaroni	24 x 133	59.7	31.7	CAR	()	388SS-11A	Cesaroni	29 x 142	84.3	59	CAR		R H152BS-15A	Cesaroni	38 x 185	275.9	137	TRA
S* F50T-4,6 S* F50-4,6,9	Estes Aerotech	29 x 98 29 x 98	80 80	37.9 37.9	NAR NAR		G94IB-18A G100SK-14A	Loki Cesaroni	38 x 120 24 x 228	121.11 114.5	62 63.3	TRA CAR	_	R H153-13A H H155-P	Cesaroni SkyRipper	38 x 186 38 x 533	258 229	143.9 220cc	TRA TRA
S F50T-6	PML	29 x 98	80	37.9	NAR		G100-P	Contrail	38 x 407	146	140cc	TRA	- 1	R H159GR-15A	Cesaroni	29 x 320	298.2	176.6	CAR
R* F51CL-12A	Cesaroni	24 x 133	75	33	CAR		G104T-S,M,L	Aerotech	29 x 125	81.5	43.9	TRA		R H160CL-12A	Cesaroni	29 x 320	311.7	154.2	CAR
R* F51BS-13A	Cesaroni	24 x 101	49.9	22	CAR	R! (HP) (G106SK-14A	Cesaroni	29 x 187	138.3	75	CAR		R! H160SK-14A	Cesaroni	29 x 276	220.5	125	CAR
R* F52-6,8,11	Aerotech	29 x 124	78	36.6	NAR	R (HP)	G107WH-12A	Cesaroni	24 x 228	139.1	75.7	CAR		R H160LB-15A	Loki	38 x 177	260.1	120	TRA
R* F59WT-12A	Cesaroni	29 x 98	57	26.1	CAR		G115-13A	Cesaroni	38 x 127	140.6	61.8	CAR		R H163WT-14A	Cesaroni	29 x 187	166.3	78.2	CAR
S F60-4,7,10	Roadrunner	29 x 112	75.9	38.1	NAR		3117WH-11A	Cesaroni	24 x 228	142.3	79.1	CAR		R H165R-M,L	Aerotech	29 x 194	165	90	TRA
R* F62T-S,M,L R* F70WT-14A	Aerotech Cesaroni	29 x 89 24 x 101	51 52.9	30.5 22.5	TRA CAR	R (HP) (H (HP) (3118BS-15A	Cesaroni Contrail	29 x 187 38 x 407	159.1 142	76.7 140cc	CAR TRA		R! H170M-14A R H170BS-14A	Aerotech Cesaroni	38 x 192 29 x 231	319.9 217.1	182.5 102.3	TRA CAR
R* F79SS-13A	Cesaroni	24 x 101	67.8	40.1	CAR	,	G125T-14A	Aerotech	29 x 127	124.81		TRA		R H175SS-14A	Cesaroni	29 x 231	166	118.1	CAR
R (HP) F85WT-15A	Cesaroni	24 x 133	73.6	33.7	CAR		G125RL-14A	Cesaroni	29 x 187	159.6	81.9	CAR		R! H178DM-14A	Aerotech	38 x 192	283	177	TRA
R (HP) F120VM-14A	Cesaroni	29 x 98	56	25.3	CAR	H (HP) (G125-P	SkyRipper	38 x 406	145	120cc	TRA		R! H180SK-14A	Cesaroni	29 x 320	258	150	CAR
R (HP) F240VM-15A	Cesaroni	24 x 133	68.3	30.3	CAR	R (HP)	G126WT-13A	Cesaroni	29 x 142	116	52.1	CAR		R H180W-S,M,L	Aerotech	29 x 238	217.7	125	TRA
							G127RL-14A	Cesaroni	24 x 228	137.3	70.5	CAR		S H182R-14A	Aerotech	29 x 203	216.78		TRA
R* G12-RC	Aerotech	32 x 107	93	51.1	NAR	H (HP) (Contrail	38 x 407	100	140cc	TRA		R H186RT-20A	Gorilla	38 x 249	312.12		TRA
R* G25W-10A	Aerotech	29 x 124	109.48		TRA		G131SS-14A	Cesaroni Kaadan/AT	29 x 187	125.2	88.6	CAR	_ [R H194RL-14A	Cesaroni	29 x 276	260.3	136.4	CAR
R G33-5,7	Aerotech	29 x 124	100	72.2	NAR		G135R-SML	Kosdon/AT	29 x 206	146	90	TRA		S H195NT-10A R H200BS-14A	Aerotech	29 x 222	236.09		TRA CAR
R* G33MY-9A S* G38FJ-4,7	Cesaroni Aerotech	29 x 187 29 x 98	143.1 94	79.1 55	CAR NAR		G138T-14a G142-6.10.14	Aerotech Aerotech	29 x 124 29 x 113	157.1 84.3	70 38.6	nar Nar		H H200BS-14A	Cesaroni Contrail	29 x 276 54 x 762	260.8 269	127.9 N/A	TRA
S G39-6,10,P	Roadrunner	29 x 140	103	58.6	TRA	()	3142-0,10,14 G145PK-15A	Cesaroni	24 x 228	139.7	66.7	CAR		R H210R-10,P	Aerotech	29 x 238	220	110.8	NAR
S* G40-4,7	Estes	29 x 124	97.1	55.1	NAR		G150BS-13A	Cesaroni	24 x 228	142.5	65.9	CAR		H H211	Contrail	38 x 508	206	185cc	TRA
S G40W-4,7	PML	29 x 124	120	55.1	NAR	H (HP) (G170PVC-P	Contrail	38 x 406	82.9	140cc	TRA		R H220T-6,10,14	Aerotech	29 x 238	220	106.4	NAR
S* G40W-4,7,10	Aerotech	29 x 124	97.1	55.1	NAR	R (HP) (G185-12A	Cesaroni	38 x 127	128	62.1	CAR		H H222-P	Contrail	38 x 406	161	140cc	TRA
S G45-6,10,P	Roadrunner	29 x 140	110	58.6	TRA		G234-P	Contrail	38 x 414	118	90cc	TRA		R H225-14A	Cesaroni	38 x 186	273.2	123.6	CAR
R* G46-11A	Cesaroni	38 x 127	127.3	62.5	CAR		G250VM-14A		29 x 142	110	50.6	CAR		R! H225BL-P	Gorilla	38 x 249	226	162	TRA
R* G50IM-15A	Cesaroni	38 x 127	150	77.7	CAR		3300-P	Contrail	38 x 406	100	90cc	TRA		R! H226SK-14A	Cesaroni	29 x 365	305	175	CAR
R* G53FJ-5,7,10	Aerotech	29 x 124	90.9 159.1	60 86.5	nar Car	R (HP)	i339-P	Aerotech	38 x 106	110	48	TRA		R H233RL-14A R H237SS-13A	Cesaroni	29 x 320 29 x 276	311.5 206.2	163.7 147.6	CAR CAR
R* G54RL-12A R* G54-6,10,14	Cesaroni Aerotech	29 x 187 29 x 124	85	46	NAR	R H42N	IV-1∩Δ	Cesaroni	29 x 231	83.5	105.5	CAR	-1	R H238T-6,10,14	Cesaroni Aerotech	29 x 276 29 x 194	165.5	85	TRA
H (HP) G55-P	WCH	38 x 308	150.6	14200	CAR	S H45V		Aerotech	29 x 203	309.18		TRA	- 1	R H242T-6,10,14		38 x 152	231.7	115	TRA
R* G57CL-12A	Cesaroni	29 x 142	107.8	51.4	CAR	S H45V		Aerotech	38 x 202	296.74		TRA		H H245PVC-P	Contrail	38 x 719	262	275cc	TRA
R* G58WH-13A	Cesaroni	38 x 127	136.8	76.3	CAR	R H53N	IY-12A	Cesaroni	29 x 276	234.2	131.9	CAR		H H246-P	Contrail	38 x 508	222	185cc	TRA
R G60-12A	Cesaroni	38 x 127	139.4	78.4	TRA	R H54V	/H/LB-10A	Cesaroni	29 x 187	167.7	96.6	CAR		R H250G-S,M,L	Aerotech	29 x 239	219.5	120	TRA
R G60-14A	Cesaroni	38 x 127	134.2	68.3	CAR	S H55V	, ,	Aerotech	29 x 191	162.3	99.7	TRA		R H255BS-14A	Cesaroni	29 x 320	315.4	153.4	CAR
R* G61W-S,M,L	Aerotech	38 x 106	110.5	61.5	TRA	H H70-I		Propulsion	38 x 464	237	217cc	CAR		R H255WT-14A	Cesaroni	29 x 231	229.3	104.3	CAR
H (HP) G63-P	SkyRipper Agretoch	29 x 305	85 120	75cc 62.5	TRA NAR	H H70-I		RATTworks Agretoch	29 x 457	204.3 185.6	135.8c	c TRA TRA		R H268R-10,14,F H H277-P		29 x 333 38 x 712	320 292	166	nar Tra
R* G64-4,8,10 R* G65WH/LB-8A	Aerotech Cesaroni	29 x 124 24 x 228	144.3	80	CAR	R H73J- H H78-I	,	Aerotech SkyRipper	38 x 152 29 x 523	172.9	185cc	TRA		H H277-P R H295SS-13A	Contrail Cesaroni	29 x 320	252.7	370cc 177.1	CAR
R* G66LR-15A	Loki	38 x 120	134.46		TRA	R H87IN		Cesaroni	29 x 187	167.9	92.7	CAR	- 1	H H300-P	Contrail	38 x 508	161	185cc	TRA
R G67R-S,M	Aerotech	38 x 106	110	60	TRA	R H90C		Cesaroni	29 x 187	164.2	77.1	CAR		Н Н303-Р	Contrail	38 x 508	170	185cc	TRA
R* G68WH-13A	Cesaroni	29 x 142	107.8	59.9	CAR	R H90L	R-14A	Loki	38 x 177	234.4	120	TRA		R H340SS-14A	Cesaroni	29 x 365	287.3	206.7	CAR
R* G69-12A	Cesaroni	38 x 127	128.8	62.5	TRA	R H97J	-S,M	Aerotech	29 x 238	177.3	137.1	TRA		H H340-P	Contrail	38 x 719	304.5	275cc	TRA
R! (HP) G69SK-14A	Cesaroni	38 x 127	117.15		TRA	R H100		Cesaroni	38 x 186		154.4	CAR		R H399WT-12A	Cesaroni	29 x 320	282.2	132.6	CAR
R! (HP) G69SF-17A	Loki	38 x 127	106.1	63	TRA	R! H100		Loki	38 x 177	201.5	120	TRA		R H400-13A	Cesaroni	38 x 186	255	122.4	TRA
R* G69N-P	Aerotech SkyRinner	38 x 106	136.7	62.2 125cc	NAR TRA	H H100 R H110		WCH Cesaroni	38 x 403 38 x 186		189cc 152.6	CAR CAR		R H410-14A R H500-17A	Cesaroni	29 x 187	167.70		CAR
H (HP) G69-P \$ G70CT-18A	SkyRipper Loki	29 x 406 38 x 120	128 119.07	125cc	TRA TRA	R H112		Cesaroni Aerotech	38 x 191	261.1	191.2	TRA		R H500-17A S H550ST-14A	Loki Aerotech	38 x 295 38 x 206	317 312.06	156 3 176	TRA TRA
R G71R-4,7,10	Aerotech	29 x 124	107	56.9	NAR	S! H115		Aerotech	29 x 203		1113	TRA		R H550ST-14A	Aerotech	38 x 193	309.98		TRA
S* G74W-4,6	Aerotech	29 x 83	82.74	39.3	NAR	R H118		Cesaroni	29 x 231	216.2	102.8	CAR		R H565-A	Cesaroni	38 x 245	319.8	165	CAR
S! (HP) G75M-4,7,10	Aerotech	29 x 124	120.39		TRA	R H120		Cesaroni	38 x 186		136.6	CAR		R H669-P	Aerotech	38 x 152	221	98	TRA
R* G75J-S,M	Aerotech	29 x 194	135.6	104.3	TRA	H H121		Contrail	38 x 508		185cc	TRA		R H999-P	Aerotech	38 x 203	319.9	147	TRA
R* G76G-4,7,10	Aerotech	29 x 124	115	60	NAR	R! H123		Cesaroni	29 x 231	176.5	100	CAR							
S* G77R-4,7,10	Aerotech	29 x 146	102.9	58.1	NAR	R H123		Cesaroni	38 x 186		123	CAR		R 149N-P	Aerotech	38 x 184	383	190.8	NAR
R* G77R-S,M	Aerotech	29 x 150	105	58	TRA	R H123	, ,	Aerotech	38 x 152		119	TRA		R I55MY-9A	Cesaroni	38 x 245	294.6	223.8	CAR
R* G78BS-15A S* G78G-4,7,10	Cesaroni Aerotech	38 x 127 29 x 146	140.9 109.9	67 59.7	tra Nar	H H124 R H125		SkyRipper Cocaroni	38 x 533 38 x 186		220cc 125	TRA CAR		R 159WN-P S 165W-10A	Aerotech	38 x 232 54 x 217.	486 9 634.97	251.7 377	nar Tra
8 G79SS-13A	Aerotech Cesaroni	29 x 140 38 x 127	129	100	CAR	R H125		Cesaroni Loki	38 x 390	240.43		TRA		S 165W-10A	Aerotech Aerotech	38 x 216	9 634.97 634.43		TRA
S* G79W-4,7,10	Aerotech	29 x 146	108	60.1	NAR	R H128		Aerotech	29 x 194	172.9	93.6	TRA		S 165W-P	Aerotech	54 x 235	630.5	369.7	NAR
R* G79W-S.M.L	Aerotech	29 x 150	108.6	62	TRA	R H130		Aerotech	38 x 154	213.19		TRA		H 180-P	Propulsion	38 x 646	460	383cc	CAR
S* G80NT-14A	Aerotech	29 x 128	132.17		TRA	R H130		Kosdon/AT	29 x 291	247	140	TRA		H 180-P	RATTworks	29 x 730	360	276cc	
R! (HP) G80SK-14A	Cesaroni	29 x 142	92.9	50	CAR	R H133	BS-14A	Cesaroni	29 x 187	163.3	76.7	CAR		H 190L-P	RATTworks	29 x 921	493.8	361cc	TRA
R* G80LW-17A	Loki	38 x 127	122.5	60	TRA	R H135		Cesaroni	29 x 231	216.7	119.8	CAR		R I100RL/LB-17/		54 x 236	613.6	350.1	CAR
S G80T-4,7	PML	29 x 124	120	56.9	NAR	S H135		Aerotech	29 x 216			TRA		R I110LW-M,L	Loki	38 x 305	487	289	TRA
S* G80-4,7,10	Aerotech	29 x 124	120	56.9	NAR	R H140		Cesaroni	29 x 276		128.5	CAR		H 1110-P	WCH	38 x 606	499.7	334cc	CAR
S G80-4,7,10 c* COOT 7.10	Roadrunner	29 x 140	105.7	54.7	NAR	R H140		Cesaroni	29 x 187	167.7	75.9	CAR		R I115W-S,M,L	Aerotech	54 x 156	409.3	229	TRA
S* G80T-7,10 S* G80T-7 10 13	Estes Agrotoch	29 x 128	136.6	62.5 62.5	NAR NAR	H H141		Contrail	38 x 508	241	185cc	TRA		H 1117-P R 1117FJ-S.M.L	SkyRipper Aerotech	38 x 914	592 364 Q	580cc	TRA
S* G80T-7,10,13 R (HP) G82W-S,M,L	Aerotech Kosdon/AT	29 x 128 29 x 206	136.6 141	62.5 84	nar Tra	R H143 R H144		Cesaroni Loki	38 x 186 38 x 190	247 239.3	187 126	CAR TRA		R I117FJ-S,M,L H I119-P	Aerotech SkyRipper	54 x 156 38 x 711	364.9 407	253 400cc	TRA TRA
(iii / GOLTT-U,IVI,L		29 x 142	107.4	51.1	CAR	R H148		Aerotech	38 x 152		122	TRA		R I120IM-15A	Cesaroni	54 x 143	501.8	263.1	CAR
R (HP) G83BS-14A	Cesaroni	29 X 147									166			LUIIII IUM	Joodi VIII	OTA ITU			VI II I

Designation Notes	Mfg.	Size (mm)	Total Impulse (N-sec.)	Propel. Mass (grams)	Cert. Group		Designation Notes	Mfg.	Size (mm)	Total Impulse (N-sec.)	Propel. Mass (grams)	Cert. Group		Designatio Notes	n	Mfg.	Size (mm)	Impulse	Propel. Mass (grams)	Cert. Group
H 1130(300CC098J)-	P Hypertek	54 x 546	470.6	300cc	TRA		R! 1316SF-17A	Loki	38 x 292	<u> </u>	<u> </u>	TRA	_	R J270GR-13	A	Cesaroni	38 x 367	650.3	376	CAR
H 1136(300CC098J2	21	54 x 546	507	300cc	TRA		R I324RT-20A	Gorilla	38 x 370			TRA		S J270W-14A		Aerotech	38 x 355	703.39		TRA
S 1140W-14A	Aerotech	38 x 203	335.53	183	TRA		R I325WW-18	Animal	38 x 370	594	316.8	NAR		H J270FX(440CC	125JFX)-P	Hypertek	54 x 614	802.2	440cc	TRA
! I140SK-14A	Cesaroni	54 x 143	395.6	210.4	CAR		R! I327DM-14A	Aerotech	38 x 337	539	354	TRA		H J272-P		Contrail	54 x 922	1065.5		TRA
1145FX(300CC098JF		54 x 546	541	300cc	TRA		H 1333-P	Contrail	38 x 922		460cc	TRA		R J275W-S,M		Aerotech	54 x 230	774	472	TRA
1147-P	SkyRipper	38 x 711	519	400cc	TRA		R 1345-15A	Cesaroni	38 x 245			CAR		H J277WS-P		Contrail	54 x 914	1031	N/A	TRA
1150BS-11A 1154J-6,10	Cesaroni Aerotech	54 x 152 38 x 241	465.1 378	224 252.8	TRA TRA		S 1350R-10 R 1350SS-16A	Aerotech Cesaroni	38 x 355 38 x 367	634 601	348 413	TRA CAR		R J280SS-16/ R J285-15A		Cesaroni Cesaroni	54 x 236 38 x 360	716.5 684	512 327	CAR CAR
I I155HP-P	Contrail	38 x 719	541	370cc	TRA	- 1	R 1357T-S,M,L	Aerotech	38 x 203	342	170	TRA	П	R J290WH-15		Cesaroni	38 x 367	683.6	381.5	CAR
I160-P	Propulsion	38 x 646	484	383cc	CAR		R I360-15A	Cesaroni	38 x 367	625.5		TRA		H J292-P		Contrail	54 x 719	734	530cc	TRA
1161W-S,M,L	Aerotech	38 x 191	328.7	178.6	TRA		R I364FJ-6,10,14	Aerotech	38 x 337	570	396	TRA		R J293BS-13	A	Cesaroni	54 x 236	837.8	414	TRA
1165CS-17A	Cesaroni	54 x 69	518.2	230.1	CAR		R I366R-M,L	Aerotech	38 x 299	539	300	TRA		R J295-16A		Cesaroni	54 x 320	1196.3	594	CAR
1170G-10A	Aerotech	54 x 174	418.54		TRA	_1.	R 1370F-P	Kosdon/AT	38 x 368	634.3		TRA		H J295FX(440CC	-	Hypertek	54 x 552	655	440cc	TRA
1170-14a	Cesaroni	38 x 245		187.5	CAR	-11	R 1375GG-20	Animal	38 x 370		340.2	NAR		R J300-15A		Cesaroni	38 x 360	694	345.4	TRA
1170S-L 1175WH-14A	Kosdon/AT	38 x 314 38 x 245	374 411.4	182 228.9	TRA CAR		R I377CT-18A R I389GT-20A	Loki Gorilla	38 x 640 38 x 370	522.2 553.1		TRA TRA		R J315R-L,P H J315-P		Aerotech	54 x 230 81 x 552	763.3 998.8	438 440cc	TRA TRA
1175WH-14A 1180W-14A	Cesaroni Aerotech	38 x 201	325.58		TRA		R! 1392BL-18A	Gorilla	38 x 370	446.1		TRA		R J316PK-17/		Hypertek Cesaroni	38 x 367	654.3	337.9	CAR
! I180SK-14A	Cesaroni	38 x 245	338.43		TRA		R 1396LS-17A	Loki	38 x 406		372	TRA		R J320LR-14/		Loki	38 x 406	721	372	TRA
I195-16A	Cesaroni	38 x 245	396.2	204.9	CAR		H I400-P	Contrail	38 x 922	432	550cc	TRA		R J325-P		Cesaroni	54 x 326	1099	537	CAR
I195WW-18	Animal	38 x 249	358	192.2	NAR		R I405LW-17A	Loki	38 x 305	493.2		TRA		R J330-16A		Cesaroni	38 x 419	765	392	CAR
I195J-6,10,14	Aerotech	38 x 299	426.1	272	TRA		R I430LB-15A	Loki	38 x 292	532.6	240	TRA		H J330FX(835CC	172JFX)-P	Hypertek	81 x 552	1051	835cc	TRA
I200W-6,10,14	Aerotech	29 x 333	324.5	186.5	TRA		R I435T-6,10,14	Aerotech	38 x 299	568.9		TRA		H J333-P		Contrail	38 x 1220		830cc	TRA
I204IM-13A	Cesaroni	29 x 320	347.7	185.4	CAR		R 1450F-L	Kosdon/AT	38 x 368	633	302	TRA		R J335-15A		Cesaroni	38 x 367	649.2	341.5	CAR
1205-13A	Cesaroni	38 x 245	380.9	206.1	TRA		R 1455VM-16A	Cesaroni	54 x 143	474.9		CAR		H J335BG-P		Contrail	54 x 719	679	530cc	TRA
I205W-14A I205(300CC125J)-	Aerotech	29 x 304	339.34		TRA	_1.	R 1462WC-18A	Gorilla	38 x 370	556.7		TRA		H J337B-P		SkyRipper	54 x 727	1073	830cc	TRA
I205(300CC125J)- I210LR-14A	71	54 x 546	469 489.8	300cc	TRA TRA	-11	R 1470-15A S 1500T-14A	Cesaroni	38 x 303	540.1 614.4	247.2 5 248	CAR TRA	٠.	R! J340M-14A H J345-P		Aerotech	38 x 336	651.7	365	TRA TRA
1210LR-14A 1210-P	Loki Contrail	38 x 292 38 x 915		240 550cc	TRA		5 15001-14A H 1500-P	Aerotech Contrail	38 x 355 38 x 712		5 246 275cc	TRA		H J348B-P		Contrail SkyRipper	38 x 1227 54 x 607	7 891 716	735cc 550cc	TRA
1211W-6,10,14	Aerotech	38 x 248	441.6	238	TRA		R I540WT-16A	Cesaroni	38 x 367	635	269.4	CAR		R! J350SF-PS		Loki	54 x 327	931	574	TRA
1212SS-14A	Cesaroni	38 x 245	364	275	CAR		Ra 1550R-20	Kosdon/AT	38 x 370		295	NAR		R J350W(.5" core		Aerotech	38 x 337	670.1	361.1	TRA
1215R-S,M,L	Aerotech	54 x 156	397	208	TRA		R I566-16A	Cesaroni	38 x 245		183.6	CAR		R J350W(.425" or		Aerotech	38 x 337	697.4	381.1	TRA
1216CL(I)-14A	Cesaroni	38 x 367	636.1	312.5	CAR		R 1599N-P	Aerotech	54 x 156	404.9	195	TRA		R J354WH-16	iΑ	Cesaroni	38 x 421	818.7	457.8	CAR
1218WT-14A	Cesaroni	54 x 152	491.2	230	TRA		R 1600R-M	Aerotech	38 x 337	597.3	330	TRA		R J355-16A		Cesaroni	54 x 329	1189.5	669	CAR
1218R-6,14,P	Aerotech	38 x 203	330	172.7	NAR		H 1727-P	Contrail	38 x 922	611	410cc	TRA		H J355-P		Contrail	54 x 712	678.9	530cc	TRA
1220SK-20	Animal	38 x 249	358	201.9	NAR		H 1747-P	Contrail	38 x 719		22500	TRA		R J357BS-17/		Cesaroni	38 x 360	657.6	338	TRA
I221-P I222(300CC125J2	Contrail	38 x 712	370 519	370cc 300cc	TRA TRA	-1.	R 1800-16A R 11299N-P	Cesaroni	38 x 303	419 422	221 192	CAR TRA		R J357WW-P H J358-P		Animal	54 x 326 54 x 922	1000 913.9	548.1 910cc	NAR TRA
1222(300CC125J2 1223SK-14A)-P Hypertek Cesaroni	54 x 546 38 x 303	434.05		TRA	-11	R I1299N-P	Aerotech	38 x 250	422	192	INA	٠.	R J360-15A		Contrail Cesaroni	38 x 419	826	413.1	TRA
1223GT-20A	Gorilla	38 x 249			TRA		R J90W-S,M,L	Aerotech	54 x 243	707.3	426	TRA		R J360SM-16		Cesaroni	54 x 320	1015.9		TRA
1224CL-15A	Cesaroni	29 x 365	381.5	182.5	CAR		R J94MY-P	Cesaroni	38 x 367	644	372.9	CAR		R! J365SK-P		Animal	54 x 403	1125	702.3	NAR
I225FJ-6,10,14	Aerotech	38 x 250	368	264	TRA		R J99N-P	Aerotech	54 x 244	945.2	556	TRA		R! J365BL-P		Gorilla	54 x 326	852	498	TRA
1225FX(300CC125JF	()-P Hypertek	54 x 546	527.5	300cc	TRA		H J115(440CC076J)-P	Hypertek	54 x 614	474	440cc	TRA		R J370GG-P		Animal	54 x 326	1040	598.3	NAR
1229T-S,M,L	Aerotech	54 x 156	411	206	TRA		H J120FX(440CC076JFX)-P	Hypertek	54 x 614	758	440cc	TRA		R J380SS-16/		Cesaroni	54 x 320	1043	769	CAR
1235WC-P	Gorilla	38 x 249		313	TRA		S J135W-S,M,L	Aerotech	54 x 368	1069	663	TRA		R! J381SK-15/		Cesaroni	38 x 421	659.9	688	TRA
1236BS-17A	Cesaroni	38 x 243	413	204	TRA		R J140WH/LB-P	Cesaroni	54 x 329	1210.		CAR		R J394GR-13		Cesaroni	38 x 500	970.4	572.1	CAR
1240-15A 1242WH-15A	Cesaroni	38 x 303	555.8	279 305.2	TRA CAR	-1.	H J140-P	Propulsion	38 x 881	664	596cc	CAR		R J395-P R J395RT-P		Cesaroni	54 x 326	1079.3		CAR
1242WH-13A	Cesaroni	38 x 303 29 x 365	548.2 381.7	212.1	CAR	-11	H J144-P R! J145SK-19A	SkyRipper	38 x 914 54 x 236		580cc 417	TRA CAR	٠.	R J395RT-P R J400SS-16/		Gorilla	N/A x N/A 38 x 419	1026 700	524 490	TRA
1245WN-15A 1245G-S,M,L	Cesaroni Aerotech	38 x 201	334.07		TRA		R J150MY-P	Cesaroni Cesaroni	38 x 500			CAR		R J400SS-10/		Cesaroni Animal	54 x 326	1100	558	NAR
1247WS-P	Contrail	54 x 711	637	N/A	TRA		H J150-P	Contrail	38 x 922		550cc	TRA		R J400-P		Cesaroni	54 x 326	976.9	723	CAR
I250-P	Alpha	54 x 711	540	353.8	NAR		H J160-P	RATTworks	38 x 121		490cc	TRA		R J401FJ-S,M		Aerotech	54 x 314	1115.4		TRA
1250HP-P	Contrail	38 x 719		275cc	TRA		R J167WC-P	Gorilla	54 x 326		600	TRA		R J405S-L		Kosdon/AT	38 x 476	722	367	TRA
1255-16A	Cesaroni	38 x 303	517.3	273.2	CAR		H J170(440CC098J)-P	Hypertek	54 x 614	728	440cc			R J410-16A		Cesaroni	38 x 421	773.8	409.8	CAR
I260(440CC172J)		54 x 614		440cc	TRA		R J175LW-PS	Loki	54 x 330		630	TRA		R J415W-S,M		Aerotech	54 x 314	1232	697	TRA
1271BB-20	Animal	38 x 258	390	188.7	NAR		R J180T-S,M,L	Aerotech	54 x 230		437.1	TRA		H J416-P		Contrail	54 x 922	1130	910cc	TRA
1280DM-14A	Aerotech	38 x 355	561.44		TRA	_ [] .	H J190FX(440CC098JFX)-P		54 x 614		440cc			R J420CL-15/		Cesaroni	38 x 500	1007.8		CAR
1280F-L	Kosdon/AT	38 x 314		182	TRA		R J210-16A	Cesaroni	54 x 236		396	CAR/NAR		R J420R-S,M,		Aerotech	38 x 337	658	345	TRA
I284W-6,10,14 I285R-10,14,P	Aerotech Aerotech	38 x 299 38 x 250		315.9 230.2	TRA NAR		H J220(440CC110J)-P H J222-P	Hypertek Contrail	54 x 645 38 x 122		440cc 830cc			S J425R-14A S J425R-14A		Aerotech Aerotech	38 x 356 38 x 356	675.51 680.33		TRA TRA
1285-15A	Cesaroni	38 x 303		272.4	TRA		R! J230SK-P	Animal	54 x 326		525.7	nar		R J425BS-16		Aerotech Cesaroni	38 x 419	783.9	406	TRA
1285GG-20	Animal	38 x 258	353	206.5	NAR		H J234-P	Contrail	54 x 922		910cc			R J430WT-18		Cesaroni	54 x 236	821.1	384	CAR
1287SS-15A	Cesaroni	38 x 303		363	CAR		R J240-16A	Cesaroni	54 x 236		446	CAR		R J440BB-20		Animal	38 x 370	653	313.1	NAR
1290-P	Contrail	38 x 922		460cc	TRA		H J242-P	Contrail	38 x 122		830cc	TRA		R J440BB-P		Animal	54 x 326	1109	528.4	CAR
1297SK-15A	Cesaroni	38 x 367	542.8	591	TRA		R J244WH-14A	Cesaroni	54 x 236	867.2	472.1	CAR		R J449BS-15	A	Cesaroni	54 x 320	1260.5	624	TRA
1300T-6,10,14	Aerotech	38 x 250	440	221.6	NAR		H J245-P	Contrail	54 x 719		530cc			R J450ST-P		Animal	54 x 326	1070	533.1	NAR
I301W-18	Kosdon/AT	38 x 370		310	NAR	_ [H J246-P	Contrail	38 x 922		550cc			R! J450BL-P		Gorilla	54 x 402	1121	658	TRA
1303BS-16A	Cesaroni	38 x 302		270	TRA		R! J250SK-15A	Cesaroni	54 x 236			TRA		R J453WH-16		Cesaroni	38 x 500	1012.6		CAR
I305FJ-6,10,14	Aerotech	38 x 299		330	TRA		H J250-P	Contrail	38 x 711	430	370cc			R J460T-S,M,I		Aerotech	54 x 230	806	386	TRA
1307-P	Contrail N Hyportok	38 x 915		550cc	TRA		H J250(4400C125J)-P	Hypertek Agretoch	54 x 614					R J475BB-P		Animal	54 x 403		704.5	CAR
I310(440CC172 I310S-S,L,P	J) Hypertek Kosdon/AT	54 x 645 38 x 368	574.5 633.8	440cc 316.3	TRA TRA		R J250FJ-S,M,L,XL H J261G-P	Aerotech SkyRinner	54 x 241 54 x 727	711.6 1248	511 830cc	TRA TRA		R J475-P R J480BB-P		Cesaroni Animal	54 x 326 54 x 326	1024.9 1165	723 556	CAR NAR
	Animal	38 x 370		333.7	NAR		H J263G-P	SkyRipper SkyRipper	54 x 727	844	550cc			R J485WC-PS		Gorilla	54 x 326		552	TRA
1315SK-20			:1//	JJJ./	IWHN		11 02000-	οκγηιμμει	J4 X 00/	044	JJUUCC	IDA		11 1400000-15		uuiild	J4 X J20	1009./	JUZ	INA

Notes	Mfg.		Impulse	Propel. Mass grams)	Cert. Group	Note	Designation es	Mfg.		Impulse		Cert. Group		Designation Notes	Mfg.	Size (mm)	Impulse		Cert. Group
D 1500CT 004	Animal	<u> </u>		· ·	TDA		1/4700T D	Animal	<u> </u>	<u> </u>		TDA	-	D 1/700D D	Assetsels	<u>'''</u>	<u> </u>		TDA
R J500ST-20A R J500G-S,M,L	Animal Aerotech	38 x 370 38 x 344	660 693.35	327 375	TRA TRA		K470ST-P K475WW-P	Animal Animal	75 x 302 54 x 403	1679 1400	826 728.6	tra Nar		R K780R-P R K800BB-P	Aerotech Animal	75 x 395 54 x 492	2371 1950	1268 914	TRA NAR
R J510WL-L	Aerotech	38 x 584	1162.4	662	TRA		K480W-PS	Aerotech	54 x 570	2273.3		TRA		R K805G-P	Aerotech	54 x 401	1762	871.1	TRA
R! J520SK-16A	Cesaroni	38 x 510	658	498	TRA		K490GR-16A	Cesaroni	54 x 488	1978.4		CAR		R K805WC-PS	Gorilla	54 x 492	1765	920	TRA
R J520F-S,M,L	Aerotech	38 x 368	645.93		TRA		K500-18A	Cesaroni	54 x 404	1595.6		CAR		R! K815SK-P	Cesaroni	54 x 649	2303.7	1342.1	CAR
R J525LW-P-SM R J528LW-17A	Loki Loki	54 x 330 38 x 419	1112.5 741	625 374	TRA TRA		K500SK-P K500SP-P	Animal Contrail	75 x 368 54 x 1524	1811 2237	1123.5 N/A	nar Tra		R K820BS-17A R K828BT-P	Cesaroni Gorilla	54 x 572 54 x 492	2383 1786.1	1164 966	CAR TRA
R J530IM-15A	Cesaroni	38 x 500	1115.5	576.5	CAR		K510-P	Cesaroni	75 x 350	2486	1197	CAR		R K828FJ-S,M,L,XL	Aerotech	54 x 579	2052.1	1450	TRA
R J535BT-P	Gorilla	54 x 327	1113.8	590	TRA	R F	K513FJ-S,M,L,XL	Aerotech	54 x 410	1496.3	974	TRA		R! K830SF-PS	Loki	54 x 726	2287	1376	TRA
R J540R-S,M,L,P	Aerotech	54 x 314	1161	679	TRA		K515SK-16A	Cesaroni	38 x 500	1653.9		CAR	П	R K850DM-16A	Aerotech	54 x 549	1863.1	1224	TRA
H J555-P R J570W-S,M,L	Contrail Aerotech	38 x 1220 38 x 479	795 973	735cc 535.8	TRA TRA		K520WH-17A K520RT-P	Cesaroni Gorilla	54 x 404 N/A x N/A	1710.5 1356	944 698	CAR TRA		R K855-P H K888BM-P	Cesaroni Contrail	54 x 491 76 x 1016	1725.2 3 2400	1205 2050cc	CAR TRA
R J575FJ-S,M,L	Aerotech	38 x 479	805	519	TRA		K525WS-P	Contrail	54 x 1219		N/A	TRA		R K940WT-18A	Cesaroni	54 x 404	1632.7	768	CAR
R J580SS-17A	Cesaroni	38 x 510	896.3	550	TRA		K530SS-16A	Cesaroni	54 x 404	1412	1025	CAR		R K950ST-P	Animal	54 x 492	1860	887.4	NAR
R J595BS-16A	Cesaroni	38 x 510	985	510	TRA		K530GG-P	Animal	54 x 403	1410	796.7	NAR	П	R K960LWB-P-SM	Loki	54 x 499	1946	960	TRA
R J600RL-16A	Cesaroni	38 x 510	998.6	688	TRA		K533BL-P	Gorilla	54 x 491	1420	900	TRA		R K975WW-P-SM	Animal	54 x 728	2450	1357.3	NAR
R J605F-L R J607WC-18A	Kosdon/AT Gorilla	38 x 476 38 x	737 677.94	367 360	TRA TRA		K535W-14A K535W-14A	Aerotech Aerotech	54 x 358 54 x 358	1421.5 1414.8		TRA TRA		S K990DM-14A R K1000S-P	Aerotech Kosdon/AT	54 x 610 54 x 728	1867.1 2592.7	1224 1301	nar Tra
H J642-P	Contrail	54 x 922	1092.6		TRA		K535-P	Cesaroni	54 x 403	1441.8		CAR		R! K1000SK-P-SM	Animal	54 x 728	2120	1297	NAR
R J712LB-15A	Loki	38 x 406	751.9	372	TRA	R! I	K540M-14A	Aerotech	54 x 401	1596.3	876.7	TRA		S K1050W-P	Aerotech	54 x 676	2530	1362.2	TRA
R J745-P	Cesaroni	54 x 326	1196.4	549	CAR		K550W-S,M,L,XL	Aerotech	54 x 410	1568	889.1	TRA		R K1050W-PS	Aerotech	54 x 648	2426	2240	TRA
R J750SP-16A R J760WT-19A	L0ki Cecaroni	38 x 622 54 x 329	942 1265.7	617 576	TRA CAR		K555SK-P K555WH-P	Animal	54 x 492	1300 2406.2	862 1407	NAR CAR		R K1075GG-P R! K1075SK-P	Animal	54 x 728	2400 2245.1	1399.9 1259	NAR CAR
K J/60WI-19A H J800-P	Cesaroni Contrail	54 X 329 38 X 1227	1265.7 928	576 685cc	TRA		K555BG-P	Cesaroni Contrail	75 x 350 54 x 1220		1407 1490cc			R! K1075SK-P R K1085WT-P	Cesaroni Cesaroni	54 x 728 75 x 350	2245.1 1125	1259 2412	CAR
R J800T-S,M,L,XL	Aerotech	54 x 314	1295	619.4	TRA		K560RR-P	Animal	54 x 430	1480	750	NAR		R K1100T-S,M,L,XL	Aerotech	54 x 398	1472	771	TRA
R J825R-M	Aerotech	38 x 479	970	497	TRA	R I	K560W-P-SM	Aerotech	75 x 396	2511	1425	TRA		R K1103X-14A	Aerotech	54 x 401	1789.5	830	TRA
R J1026CT-14A	Loki	38 x 625	1266.9	616	TRA		K570-17A	Cesaroni	54 x 488	2062.9		CAR		R K1127LB-14A	Loki	38 x 625	1284.6		TRA
R J1055-17A R J1299N-P	Cesaroni Aerotech	54 x 236 54 x 230	746.6 845	358 371.6	CAR TRA		K570WW-P K575SS-P	Animal Cesaroni	54 x 492 75 x 395	1700 2493	914.6 1803	NAR CAR		R K1130BB-P R K1185GT-P	Animal Gorilla	54 x 728 54 x 728	2550.7 2460	1334 1314	CAR TRA
R J1365-P	Cesaroni	54 x 326	932.4	444	CAR		K590-P	Cesaroni	54 x 403	1336.5		CAR	L	R K1200-16A	Cesaroni	54 x 404	1364	960	CAR
R J1423N-P	Aerotech	54 x 230	845	371.6	TRA		K600WH-17A	Cesaroni	54 x 488	2129.8		CAR	Г	R K1250WW-P	Animal	54 x 491	1950.9		CAR
R J1520-17A	Cesaroni	54 x 329	1092.5	1026	CAR	T F	K600TR-P	RATTworks	64 x 1219	2170	1476cc	/370ml TRA		R K1275R-P	Aerotech	54 x 568	2224.9	1170	TRA
R J1799N-PS	Aerotech	54 x 314	1066.1	540	TRA		K600WW-P-SM	Animal	75 x 368	2500	1223.3	NAR		R K1440-17A	Cesaroni	54 x 572	2437	1129	CAR
R J2135N-P	Aerotech	54 x 314	1261	557.4	TRA		K600F-S,M,L,P K605RR-P	Kosdon/AT Animal	54 x 403 75 x 368	1428.5 2410	724.3 1231	TRA NAR	L	R K1499N-P R K1620-P	Aerotech Cesaroni	75 x 260 98 x 240	1321 2436.9	604 1193	TRA
R K160CL-6	Cesaroni	54 x 404	1525.5	772	CAR		K610SK-P	Animal	54 x 491	1531	861	CAR	Г	R K1720-P	Cesaroni	54 x 403	1176.2		CAR
R K185W-S,M,L	Aerotech	54 x 437	1417.2		TRA		K627LR-5,7,11,14	Loki	38 x 1200			TRA		Ra K1750R-P	Kosdon/AT	54 x 728	2423	1253	NAR
R K222WC-P	Gorilla	54 x 402	1315	800	TRA		K630BS-15A	Cesaroni	54 x 404	1679.4		TRA		R K1999N-P	Aerotech	98 x 275	2569	1195	TRA
H K234-P	Contrail	54 x 1220	1657 2049	1490cc	TRA TRA		K630-P K630WC-PS	Contrail	75 x 813	1341	1400cc		I.	R K2000VM-P	Cesaroni	75 x 350	2329.9		CAR
R K235WC-P H K240(835CC125J)-P	Gorilla Hypertek	75 x 368		1189	INA		K635-17A	Gorilla Cesaroni	54 x 403 54 x 488	1414.8		TRA	ľ	R K2045-17A R K2050ST-PS	Cesaroni	54 x 404	1407.6	716	CAR
H K240H-P	Пуропок	81 x 552		835cc	TRA	R K				19944	1115					54 x 381	13847	674	TRA
	RATTworks	81 x 552 64 x 908	1292 1844.7	835cc 1507cc	TRA TRA		K650SS-16A	Cesaroni	54 x 488	1994.4 1749.5		CAR CAR		11 120000110	Aerotech	54 x 381	1384.7	674	TRA
	RATTworks Aerotech		1292			R I								H L200(1685CC098L)-P		54 x 381 75 x 1031	1384.7 2639	674 1685cc	
S K250W-P S K250W (LMS)-P	Aerotech Aerotech	64 x 908 54 x 673 54 x 649	1292 1844.7 2484 2342	1507cc 1543 1400	tra Tra Tra	R H R H	K650SS-16A K650PK-21A K650T-P	Cesaroni Cesaroni Aerotech	54 x 488 54 x 488 98 x 289	1749.5 1997.1 2405.7	1281 1135 1280	CAR CAR TRA	l.	H L200(1685CC098L)-P H L225FX(1685CC098LFX)-P	Hypertek Hypertek	75 x 1031 75 x 1031	2639 2789	1685cc 1685cc	TRA TRA
S K250W-P S K250W (LMS)-P R K250LWM-P-SM	Aerotech Aerotech Loki	64 x 908 54 x 673 54 x 649 54 x 499	1292 1844.7 2484 2342 1607	1507cc 1543 1400 938	tra Tra Tra Tra	R H R H R H	K650SS-16A K650PK-21A K650T-P K650RR-P	Cesaroni Cesaroni Aerotech Animal	54 x 488 54 x 488 98 x 289 54 x 492	1749.5 1997.1 2405.7 1840	1281 1135 1280 931	CAR CAR TRA NAR		H L200(1685CC098L)-P H L225FX(1685CC098LFX)-P R L265MY-P	Hypertek Hypertek Cesaroni	75 x 1031 75 x 1031 54 x 649	2639 2789 2644.6	1685cc 1685cc 1603	TRA TRA CAR
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P	Aerotech Aerotech Loki SkyRipper	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912	1292 1844.7 2484 2342 1607 1733	1507cc 1543 1400 938 1130cc	TRA TRA TRA TRA TRA TRA	R H R H R H	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P	Cesaroni Cesaroni Aerotech Animal Contrail	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711	1749.5 1997.1 2405.7 1840 2132	1281 1135 1280 931 1400cc	CAR CAR TRA NAR TRA		H L200(1685CC098L)-P H L225FX(1685CC098LFX)-P R L265MY-P R L339N-P	Hypertek Hypertek Cesaroni Aerotech	75 x 1031 75 x 1031 54 x 649 98 x 302	2639 2789 2644.6 2793	1685cc 1685cc 1603 1796	TRA TRA CAR TRA
S K250W-P S K250W (LMS)-P R K250LWM-P-SM	Aerotech Aerotech Loki	64 x 908 54 x 673 54 x 649 54 x 499	1292 1844.7 2484 2342 1607	1507cc 1543 1400 938 1130cc 1149.3	tra Tra Tra Tra	R F R F R F R F	K650SS-16A K650PK-21A K650T-P K650RR-P	Cesaroni Cesaroni Aerotech Animal	54 x 488 54 x 488 98 x 289 54 x 492	1749.5 1997.1 2405.7 1840	1281 1135 1280 931 1400cc 1177	CAR CAR TRA NAR		H L200(1685CC098L)-P H L225FX(1685CC098LFX)-P R L265MY-P	Hypertek Hypertek Cesaroni Aerotech Hypertek	75 x 1031 75 x 1031 54 x 649	2639 2789 2644.6 2793 3042.9	1685cc 1685cc 1603 1796	TRA TRA CAR TRA TRA
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260CL-P R K261WH/LB-P H K265SP-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 572 54 x 488 54 x 1219	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684	1507cc 1543 1400 938 1130cc 1149.3 1151.9	TRA TRA TRA TRA TRA TRA CAR CAR TRA	R F R F R F R F R F R F	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P K660-17A K661BS-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9	1281 1135 1280 931 1400cc 1177 1182 964	CAR CAR TRA NAR TRA CAR CAR CAR		H L200(1685CC098L)-P H L225FX(16850039LFX)-P R L265MY-P R L339N-P H L355fX(1685CC125L)-P H L365FX(1685CC125L)-P H L369-P	Hypertek Hypertek Cesaroni Aerotech Hypertek	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347	2639 2789 2644.6 2793 3042.9 2851 3829	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc	TRA TRA CAR TRA TRA TRA TRA TRA
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260CL-P R K261WH/LB-P H K265SP-P R K270W-S.M.L.XL	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 572 54 x 488 54 x 1219 54 x 579	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc	TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA TRA	R F R F R F R F R F R F	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P K660-17A K661BS-P K666-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Animal	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403 54 x 492	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9	1281 1135 1280 931 1400cc 1177 1182 964 1014	CAR CAR TRA NAR TRA CAR CAR CAR NAR	П	H L200(1685CC098L)-P H L225FX(168500098LF)-P R L2359N-P H L3359N-P H L355FX(1685CC125L)-P H L369-P R L395MY-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423	TRA TRA CAR TRA TRA TRA TRA TRA CAR
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260CL-P R K261WH/LB-P H K26SSP-P R K270W-S,M,LXL R K300CL-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Cesaroni	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 572 54 x 488 54 x 1219 54 x 579 54 x 649	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7	TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR CAR TRA TRA CAR	R	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P K660-17A K661BS-P K665-P K670GG-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Animal Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403 54 x 492 54 x 491	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1	1281 1135 1280 931 1400cc 1177 1182 964 1014 955	CAR CAR TRA NAR TRA CAR CAR CAR CAR CAR	ľ	H L200(1685CC098L)-P H L225FX(1685C008R,F)-P R L265MY-P R L339N-P H L356FX(1685CC125L)-P H L356FX(1685CC125LF)-P H L395-P R L395-MY-P R L400W-PS	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1347 75 x 757 98 x 444	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260CL-P H K26SP-P R K270W-SMLXL R K300CL-P H K300-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 572 54 x 488 54 x 1219 54 x 579	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc	TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR CAR TRA TRA CAR TRA TRA CAR	R R R R R R R R R R	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P K660-17A K661BS-P K666-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Animal	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403 54 x 492 54 x 491 75 x 368	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184	CAR CAR TRA NAR TRA CAR CAR CAR NAR	ľ	H L200(1685CC098L)-P H L225FX(1685C008LPA)-P R L265MY-P R L339N-P L355V(1685CC125L)-P H L355FX(1685CC125L)-P H L365PA R L400W-PS R L405W-PS	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
\$\text{S} \text{K250W-P}\$\$ \$\text{K250W (LMS)-P}\$\$ \$\text{K250LWM-P-SM}\$\$ \$\text{K250L-P}\$\$ \$\text{K261WH/LB-P}\$\$ \$\text{K265W-P}\$\$ \$\text{K265W-P}\$\$ \$\text{K270W-SM_XL}\$\$ \$\text{K300C-P}\$\$ \$\text{K300-P}\$\$ \$\text{K301-P}\$\$	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Cesaroni Contrail	64 x 908 54 x 673 54 x 649 54 x 912 54 x 572 54 x 1219 54 x 579 54 x 649 75 x 1016	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc	TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR CAR TRA TRA CAR TRA TRA CAR	R R R R R R R R R R	K650SS-16A K650PK-21A K650T-P K650RR-P K654BS-P K660-17A K661BS-P K660S-P K670GG-P K670WC-PS	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Animal Cesaroni Gorilla	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403 54 x 492 54 x 491	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184	CAR CAR TRA NAR TRA CAR CAR CAR CAR CAR TRA CAR TRA CAR TRA CAR		H L200(1685CC098L)-P H L225FX(1685C008LPA)-P R L265MY-P R L339N-P L355V(1685CC125L)-P H L355FX(1685CC125L)-P H L365PA R L400W-PS R L405W-PS	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1347 75 x 757 98 x 444	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696 1837 1685cc	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
\$\text{S} \text{ \$\text{K250W-P}\$ \$ \$ \$\text{K250W} \text{(LMS)-P-SM}\$ \$ \$\text{K250LWM-P-SM}\$ \$ \$\text{K250C-P}\$ \$ \$\text{K250C-P}\$ \$ \$\text{K2650C-P}\$ \$ \$\text{K2650P-SM_LXL}\$ \$ \$\text{K300C-P}\$ \$ \$\text{K321-P}\$ \$ \$\text{K321-P-P}\$ \$ \$\text{K321-P-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K357WC-P-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K357WC-P-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K347B-P}\$ \$ \$\text{K357WC-P-P}\$ \$ \$\text{K347B-P}\$ \$ \$K347B-	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Cesaroni Contrail Contrail Gorilla SkyRipper	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 572 54 x 488 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 912	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1000	TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA	R R R R R R R R R R	K650SS-16A K650PK-21A K650PR-P K650RR-P K654BS-P K6601BS-P K6601BS-P K6605-P K670GG-P K670WC-PS K670WC-PS K675SK-18A K678-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Animal Cesaroni Animal Aerotech	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 403 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA TRA		H L200(1685CC098L)-P H L225FX(1685C0098LFX)-P R L265MY-P R L339N-P H L3501(1685CC125L)-P H L369-P R L395MY-P R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L355FX(1685CC172L)-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 76 x 498 75 x 1031	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372 2774 3203.4	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696 1837 1685cc 1830	TRA
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260CL-P R K261WH/LB-P H K265S-P R K270W-S,M_LXL R K300-C-P H K301-P H K3021-P R K327WC-P H K347B-P T K350TR-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Gorilla SkyRipper RATIworks	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 572 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 64 x 914	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1000 1130cc 1170cc	TRA TRA TRA TRA TRA TRA TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PR-P K650RR-P K6561BS-P K6601BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K670WC-PS K678-P K680R-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Gesaroni Gorilla Cesaroni Contrail Animal Cesaroni Gorilla Cesaroni Contrail Aerotech Loki	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA		H L200(1685CC098L)-P H L225FX(1685C0098LFX)-P R L265FX(1685CC125L)-P H L350F(1685CC125L)-P H L356FX(1685CC125L)-P H L369-P R L409W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L535FX(1685CC172L)-P H L535FX(1685CC172L)-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Loki Hypertek Hypertek	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 757 98 x 444 76 x 498 75 x 1031 76 x 498 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372 2774 3203.4 2994	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696 1837 1685cc 1830 1685cc 2800cc	TRA
\$\text{S} \text{ \$\cup{k}\$ \text{C250W-P SM}\$ } \text{ \$\cup{k}\$ \text{C250W-P-SM}\$ } \text{ \$\cup{k}\$ \text{C250W-P-SM}\$ } \text{ \$\cup{k}\$ \text{C250C-P}\$ } \text{ \$\cup{k}\$ \text{C260U-P}\$ } \text{ \$\cup{k}\$ \text{C260U-P}\$ } \text{ \$\cup{k}\$ \text{C250V-SM_XL}\$ } \text{ \$\cup{k}\$ \text{C250V-P}\$ } \text{ \$\cup{k}\$ \text{C327VC-P}\$ } \text{ \$\cup{k}\$ \text{C325VC-P}\$ } \text{ \$\cup{k}\$ \text{C350UM-P-SM}\$ } \text{ \$\cup{k}\$ C350UM-P-S	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Contrail Gorilla SkyRipper RATTworks Loki	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 488 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 54 x 912	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1000 1130cc 1170cc 1400	TRA TRA TRA TRA TRA TRA TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650RR-P K650RR-P K650HS-P K660HS-P K660HS-P K670GG-P K670WC-PS K670WC-PS K670WC-PS K670WC-PS K670WC-PS K670F-P K680R-P K680R-P K680R-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cosaroni Animal Cesaroni Cosaroni Animal Cesaroni Contrail Aerotech Loki Aerotech	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 55 x 572 75 x 368 55 x 572 75 x 1016 98 x 289 54 x 483 54 x 410	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920 903	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA TRA TRA TRA TRA TRA TRA TRA		H L200(1685CC098L)-P H L225FX(1685C0098LFX)-P R L265fX/-P R L359N-P H L350F(1685CC125L)-P H L356FX(1685CC125L)-P H L369-P R L409W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L535FX(1685CC172L)-P H L540(2800CC172L)-P H L540(2800CC172L)-P H L550(1685CCR6L)-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Loki Hypertek Hypertek	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1031 75 x 1031 75 x 1031	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372 2774 3203.4 2994 7 4615 3095	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696 1837 1685cc 1830 1685cc 2800cc 1685cc	TRA
\$\text{S} \text{ \$\cup{k}\$ \text{C250W-P SM } \text{ \$\cup{k}\$ \text{C250W-P-SM } \text{ \$\cup{k}\$ \text{C250W-P-SM } \text{ \$\cup{k}\$ \text{C250CL-P } \text{ \$\cup{k}\$ \text{C327WC-P } \text{ \$\cup{k}\$ \text{C327WC-P } \text{ \$\cup{k}\$ \text{C350TR-P } \text{ \$\cup{k}\$ \text{C350WM-P-SM } \text{ \$\cup{k}\$ \text{C350WM-P-SM } \text{ \$\cup{k}\$ \text{C360WH-13A } C	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Gorilla SkyRipper RATIworks	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 572 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 64 x 914	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1000 1130cc 1170cc 1400	TRA TRA TRA TRA TRA TRA TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PR-P K650RR-P K6561BS-P K6601BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K670WC-PS K678-P K680R-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Gesaroni Gorilla Cesaroni Contrail Animal Cesaroni Gorilla Cesaroni Contrail Aerotech Loki	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA		H L200(1685CC098L)-P H L225FX(1685C0098LFX)-P R L265FX(1685CC125L)-P H L350F(1685CC125L)-P H L356FX(1685CC125L)-P H L369-P R L409W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L535FX(1685CC172L)-P H L535FX(1685CC172L)-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Loki Hypertek Hypertek	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 757 98 x 444 76 x 498 75 x 1031 76 x 498 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 3826.8 4654.6 3372 2774 3203.4 2994 4615 3095 7 4716	1685cc 1685cc 1603 1796 1685cc 1685cc 3200cc 3423 2696 1837 1685cc 1830 1685cc 2800cc	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W (LMS)-P R K250LWM-P-SM H K257G-P R K260UL-P R K261WH/LB-P H K265S-P R K270W-SML_XL R K300L-P H K300-P H K301-P R K327WC-P H K347B-P T K350TR-P R K350LWM-P-SM R K360WH-13A R K365R-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Gorilla SkyRipper RATTworks Loki Cesaroni	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 572 54 x 579 54 x 649 65 4 x 1220 54 x 912 64 x 914 54 x 736 54 x 329	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1000 1130cc 1400 708.2	TRA TRA TRA TRA TRA TRA TRA CAR TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PR-P K650PR-P K650HS-P K650HS-P K660-P K670GG-P K670GG-P K670WC-PS K675SK-18A K678-P K690SF-PS K690SF-PS K695P-PS K695P-PS	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cosaroni Cosaroni Animal Cesaroni Contrail Aerotech Loki Aerotech Gorilla	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 55 x 572 75 x 1016 98 x 289 54 x 433 54 x 440 54 x 440 54 x 403	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920 903 681	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C009LFX)-P R L265FX(1685CC125L)-P H L350FX(1685CC125L)-P H L369-P R L395FX/P R L405W-PS R L405W-PS H L475(1685CC172L)-P R L480LR-P H L530FX(1685CC172LF)-P H L540(2800CC172L)-P H L570FX(2800CC172L)-P H L570FX(2800CC172L)-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek	75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1031 75 x 1031 75 x 1031 75 x 1031	2639 2789 2644.6 2793 3042.9 2851 3826.8 4654.6 3372 2774 3203.4 2994 4615 3095 7 4716	1685cc 1685cc 1603 1796 1685cc 3200cc 3423 2696 1837 1685cc 1830 1685cc 2800cc 1685cc 2800cc 2800cc	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W-P-SM K250LWM-P-SM H K257G-P R K260CL-P R K260CL-P R K260W-P H K265SP-P H K300-P H K300-P H K301-P R K327WC-P H K327WC-P H K350TR-P R K350UM-13A R K365RR-P R K375WP-P R K400GR-14A	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Contrail Contrail Aerotech Cesaroni Contrail Aerotech Animal Aerotech Cesaroni Animal Aerotech Cesaroni	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 849 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 64 x 912 64 x 914 64 x 736 54 x 329 75 x 244 54 x 570 54 x 649	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1000 1130cc 1400 708.2 946 1292 924.3	TRA TRA TRA TRA TRA CAR CAR TRA CAR TRA TRA CAR TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-P K650BR-P K650BS-P K660-17A K6661BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K675SK-18A K678-P K680R-P K690SF-PS K699SR-M,L,P K699SBT-P K700W-P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Animal Cesaroni Contrail Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483 54 x 403 54 x 403	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1650 1659.6	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 903 681 1303 745	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C0098LFX)-P R L265MY-P R L359N-P L355FX(1685CC125L)-P H L355FX(1685CC125LFX)-P R L400W-PS R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L505FX(1685CC172LFX)-P H L505FX(1685CC172LFX)-P H L576FX(2800CC172LFX)-P H L576FX(2800CC172LFX)-P H L576FX(2800CC172LFX)-P H L576FX(2800CC172LFX)-P H L576FX(2800CC172LFX)-P H L575FX(2800CC172LFX)-P H L585FM-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1031 75 x 1031 75 x 1387 75 x 1387 75 x 1387 75 x 1387 75 x 350 64 x 1066	2639 2789 2644.6 2793 3042.9 2851 7 3829 4936.8 4654.6 3372 2774 3203.4 2994 7 4615 3095 7 4716 7 4831 2653.4 6 3152	1685cc 1685cc 1685cc 3200cc 3423 2696 1837 1685cc 1830 1685cc 2800cc 1830 1685cc 2800cc 1685cc 2800cc 1685cc 2800cc 2800c	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W-P-SM K250LWM-P-SM H K250L-P R K260CL-P R K260U-P R K265P-P R K260W-P-SM K300-P H K300-P H K301-P K321-P R K327WC-P H K327WC-P H K327WC-P H K305WR-P-SM R K350UM-P-SM R K350UM-P-SM R K365R-P R K375W-P R K400GR-14A R K400S-S,M,L	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Contrail Contrail Aerotech Cesaroni Contrail Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Kosdon/AT	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 848 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 64 x 912 64 x 914 54 x 329 75 x 244 54 x 570 54 x 404 54 x 404 54 x 404	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1188 1265.7 2050cc 1490cc 1400 708.2 946 1292 924.3 721.8	TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-P K650RR-P K650RR-P K650BS-P K660-17A K6661BS-P K660BS-P K670-P K670WC-PS K670WC-PS K670WC-PS K675SK-18A K678-P K690SF-PS K699SR-ML, P K699SR-ML, P K700BB-P K700P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Gorilla Cesaroni Gorilla Gorilla Cesaroni Gorilla Gorilla Gorilla Gorilla Gorilla Aerotech Gorilla Aerotech Animal Cesaroni Gorilla	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483 54 x 403 55 x 368 56 x 572 56 x 572 57 x 1016 58 x 289 54 x 483 54 x 403 55 x 368 56 x 4 803 56 x 4 803 57 x 368 57 x 4 803 57 x 368 57 x 368	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 17751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1650 1659.6 1691	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920 903 681 1303 745 1205 856	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L2257X(1685C0098L7A)-P R L265MY-P R L359N-P H L355Y(1685CC125L)-P H L355Y(1685CC125L7A)-P H L369-P R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L535FX(1685CC172L7A)-P H L545(1685CC172L7A)-P H L545(1685CC172L7A)-P H L575(2800CC172L7A)-P H L585M-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 2851 3372 2774 3203.4 2994 4615 3095 7 4716 4831 2653.4 3 3152 3 3161	1685cc 1685cc 1685cc 1685cc 34223 2696 1837 1685cc 2800cc	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W-P-SM K250LWM-P-SM H K250L-P R K260U-P R K261WH/LB-P H K265S-P R K270W-S,M_,XL R K300C-P H K321-P R K327-WC-P H K327-P R K350LWM-P-SM R K350LWM-P-SM R K350LWM-P-SM R K350LWM-P-SM R K365R-P R K375W-P R K400GR-14A R K400S-S,M_L H K404-P	Aerotech Aerotech Loki SkyRipper Cesaroni Contrail Aerotech Cesaroni Contrail Contrail Gorilla SkyRipper RATTworks Loki Cesaroni Animal Aerotech Cesaroni Kosdon/AT Contrail	64 x 908 54 x 673 54 x 649 54 x 912 54 x 572 54 x 4819 55 x 1016 54 x 1220 54 x 911 54 x 911 54 x 912 64 x 914 54 x 914 54 x 736 54 x 329 75 x 240 54 x 404 55 x 1016 57 x 1016	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1908 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1366.2 2441	1507cc 1543 1400 938 1130cc 1149.3 1151.9 2050cc 1490cc 1170cc 1490cc 1170cc 1490cc 1170cc 1490cc 1292 1400 1292 1400 1400 1292 1400 1400 1400 1400 1400 1400 1400 140	TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-P K650RR-P K650RR-P K650BS-P K6661-P K666BS-P K666B-P K666B-P K670PC-P K670WC-PS K670WC-PS K670WC-PS K675SK-18A K678-P K690SF-PS K699SF-PS K700W-P K700W-P K700PC-P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Animal Aerotech Animal Aerotech Animal Cesaroni Contrail Aerotech Corilla Cesaroni Contrail	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483 54 x 403 54 x 403 54 x 403 55 x 368 56 x 572 75 x 1016 98 x 289 57 x 403 58 x 403 59 x 403 50 x	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1650 1659.6 1691 1386	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920 903 681 1303 745 1205 856 1400cc	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L2257X(1685C0098L74)-P R L265MY-P R L339N-P H L3501(1685CC125L)-P H L369-P R L400W-PS R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P H L5367X(1685CC172L)-P H L550(1685CC172L)-P H L5767X(2800CC172L)-P H L5767X(2800C172L94)-P H L5767X(2800C172L94)-P H L600-P H L600-P H L600-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Cesaroni RATTworks WCH Cesaroni	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1031 75 x 1387 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 7 3829 4956.8 4654.6 3372 2774 3203.4 2994 7 4615 3095 7 4716 7 4831 2653.4 6 3152 3 3161 4842	1685cc 1830 1685cc 1830 1685cc 1830 1685cc 1	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W-P-SM K250LWM-P-SM H K250LWM-P-SM H K260CL-P R K261WH/LB-P H K265SP-P R K270W-S,M_,XL R K300C-P H K321-P R K327WC-P H K321-P R K350LWM-P-SM R K360WH-13A R K365RR-P R K375WP-P R K400S-S,M_L H K404-P R K401	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Contrail Contrail Aerotech Cesaroni Contrail Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Kosdon/AT	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 848 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 911 64 x 912 64 x 914 54 x 329 75 x 244 54 x 570 54 x 404 54 x 404 54 x 404	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1908 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1366.2 2441	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1000 1130cc 1470cc 1400 708.2 946 924.3 721.8 2050cc 1132	TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-P K650RR-P K650RR-P K650BS-P K660-17A K6661BS-P K660BS-P K670-P K670WC-PS K670WC-PS K670WC-PS K675SK-18A K678-P K690SF-PS K699SR-ML, P K699SR-ML, P K700BB-P K700P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Gorilla Cesaroni Gorilla Gorilla Cesaroni Gorilla Gorilla Gorilla Gorilla Gorilla Aerotech Gorilla Aerotech Animal Cesaroni Gorilla	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 483 54 x 403 55 x 368 56 x 572 56 x 572 57 x 1016 58 x 289 54 x 483 54 x 403 55 x 368 56 x 4 803 56 x 4 803 57 x 368 57 x 4 803 57 x 368 57 x 368	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1650 1659.6 1691 1386	1281 1135 1280 931 1400cc 1177 1182 964 1014 9955 1184 1140 2050cc 1316 920 903 681 1303 745 1205 856 1400cc 880.7	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C0098LPA)-P R L265MY-P R L369N-P H L359FX(1685CC125LPA)-P H L369-P R L400W-PS R L400W-PS R L425WC-PS H L475(1685CC172LPA)-P H L550(2800CC172LPA)-P H L550(2800CC172LPA)-P H L575(2800CC172LPA)-P H L550(1685CC172LPA)-P H L550(1685CC172LPA)-P H L5600-P H L600-P H L610-P H L610-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 7 3829 4936.8 4654.6 3372 2774 3203.4 2994 7 4615 3095 7 4716 7 4831 2653.4 6 3152 3 3161 4842 3 3131	1685cc 1685cc 1685cc 1685cc 34223 2696 1837 1685cc 2800cc	TRA
S K250W-P S K250W-P-SM K250LWM-P-SM H K250LWM-P-SM H K260CL-P R K260WH/LB-P H K265SP-P R K270W-SM_XL H K3000-P H K321-P R K327WC-P H K321-P R K350LM-P-SM R K360WH-13A R K366RR-P R K375WP-P R K400S-S,M,L H K404-P R K445-17A	Aerotech Aerotech Loki SkyRipper Cesaroni Cosaroni Contrail Aerotech Cesaroni Contrail Contrail Gorilla SkyRipper RATTworks Loki Cesaroni Animal Aerotech Cesaroni Kosdon/AT Contrail Gorilla	64 x 908 54 x 673 54 x 649 54 x 912 54 x 572 54 x 488 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 912 64 x 914 54 x 736 54 x 329 75 x 244 54 x 649 75 x 1016 54 x 329 75 x 244 54 x 903 75 x 245 54 x 603 55 x 603 57	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1386.2 2441 1785.7	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1000 1130cc 1470cc 1400 708.2 946 924.3 721.8 2050cc 1132	TRA TRA TRA TRA TRA TRA TRA CAR CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-21A K650PR-P K650PR-P K650BS-P K660BS-P K660BS-P K660BS-P K660BS-P K670PC-P K670WC-PS K677SK-18A K678-P K680R-P K680R-P K690SF-PS K699SR-P K700W-P K700WBB-P K700PC-P K700PC-P K700PC-P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Animal Cesaroni Contrail Aerotech Aoritech Corilla Cesaroni Contrail Aerotech Corilla Cesaroni Contrail Aerotech Corilla Aerotech Animal Cesaroni Contrail Animal	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 55 x 368 54 x 572 75 x 1016 98 x 289 54 x 483 54 x 410 54 x 403 54 x 554 55 x 368 56 x 491 57 x 368 58 x 289 59 x 289 59 x 289 50 x 368 50 x 491 50 x 491	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1650 1659.6 1691 1386 1791.4	1281 1135 1280 931 1400cc 1177 1182 964 1014 995 1184 1140 2050cc 1316 920 903 681 1303 745 1205 886 1400cc 880.7	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C0098LPA)-P R L265MY-P R L369N-P H L359FX(1685CC125LPA)-P H L369-P R L400W-PS R L400W-PS R L425WC-PS H L475(1685CC172LPA)-P H L550(2800CC172LPA)-P H L550(2800CC172LPA)-P H L575(2800CC172LPA)-P H L550(1685CC172LPA)-P H L550(1685CC172LPA)-P H L5600-P H L600-P H L610-P H L610-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Cesaroni RATTworks WCH Cesaroni Hypertek	75 x 1031 76 x 498 75 x 1031 75 x 1031 75 x 1387 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 2851 3829 4936.8 4654.6 3372 2774 3203.4 2994 4615 3095 7 4716 4831 2653.4 5 3152 5 3161 4842	1685cc 1685cc 1685cc 1685cc 1685cc 1685cc 1685cc 1685cc 1685cc 1830 1685cc 1830 1685cc 2800cc 2800cc 2800cc 2800cc 2800cc 2415 1682cc 2415 1682cc 2800cc 24800cc 248000cc 24	TRA
S K250W-P S K250W-P-SM K250LWM-P-SM H K250L-P R K260CL-P R K260CL-P R K260CL-P H K300-P H K300-P H K300-P H K321-P K321-P K321-P K321-P K347B-P T K350TR-P R K350UM-P-SM R K360WH-13A R K460S-R-P R K375W-P R K460GR-14A R K400S-S,M,L H K404-P R K4454SR-P R K450B-P-SM R K4454SK-19A	Aerotech Aerotech Loki SkyRipper Cesaroni Costrail Aerotech Cesaroni Contrail Gorilla SkyRipper RATTworks Loki Cesaroni Animal Aerotech Cesaroni Animal Gorilla Cesaroni Animal Cesaroni Animal Cesaroni	64 x 908 54 x 673 54 x 649 54 x 99 54 x 912 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 912 64 x 912 64 x 914 54 x 916 54 x 916 55 x 1016 56 x 1020 56 x 912 57 5 x 244 57 5 x 244	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1386.2 2441 1785.7 1636.3 1845 1363.7	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1188 1265.7 2050cc 1490cc 1490cc 1400 708.2 946 1292 924.3 721.8 2050cc 1330cc 1490cc	TRA TRA TRA TRA CAR CAR CAR TRA TRA TRA CAR TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA CAR NAR TRA CAR NAR TRA CAR TRA CAR NAR TRA CAR CAR NAR CAR NAR CAR	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-21A K650PK-P K650BR-P K650BS-P K660-17A K661BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K670WC-PS K675SK-18A K678-P K690SF-PS K690SF-PS K690SF-PS K700W-P K700W-P K700W-P K700BB-P K700P-P K710BB-P K710BB-P K710BB-P K711WH-18A K735SK-P K740CS-18A	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Animal Cesaroni Contrail Aerotech Gorilla Aerotech Gorilla Aerotech Animal Cesaroni Gorilla Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 410 54 x 403 54 x 403 54 x 492 75 x 368 54 x 481 55 x 368 56 x 481 57 x 368 58 x 289 58 x 289 58 x 289 59 x 289 50 x 368 50 x 403 51 x 403 52 x 403 53 x 403 54 x 492 75 x 813 54 x 492 75 x 813 54 x 404	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1659.6 1691 1386 1791.4 2377.2 1955.2 1873.9	1281 1135 1280 931 1400cc 1177 1182 964 1014 955 1184 1140 2050cc 1316 920 681 1303 745 1205 856 1400cc 140	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C0038LFX)-P R L235FX(1685C0125L)-P H L356FX(1685C0125LFX)-P H L356FX(1685C0125LFX)-P H L395-P R L400W-PS R L425WC-PS H L475f(1685CC172L)-P R L480LR-P H L536FX(1685CC172L)-P H L540CX-PS H L540CC0772L)-P H L540CX-PS H L540CX-PS H L540CC0772LFX)-P H L540CX-PS H L540CX-PS H L540CX-PS H L575FX(2800CC172LFX)-P H L560C-P H L600-P H L600-P H L600-P H L600-P H L616FX(1685CCRGL)-P H L600-P H L616FX(1685CCRGL)-P H L600-P H L616FX(1685CCRGL)-P H L600-P H L616FX(1685CCRGL)-P H L645GR-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 75 x 1031 75 x 1347 75 x 757 98 x 444 76 x 498 75 x 1031 75 x 1387 75 x 1031 75 x 1387	2639 2789 2644.6 2793 3042.9 3829 4936.8 4654.6 3372 2774 3203.4 2994 7 4615 1 3095 7 4716 7 4831 2653.4 6 3152 3152 3151 4842 3131 7 4951 2772.2 3419.8	1685cc 1685cc 2800cc 2415 1682cc 2293 2072	TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T
S K250W-P S K250W-P-SM K250LWM-P-SM H K250LWH-P-SM H K260CL-P R K260CL-P R K260CL-P R K260CL-P R K260SP-P H K300-P H K300-P H K301-P K321-P K321-P K327WC-P H K327WC-P H K347B-P T K350TR-P R K350LWM-P-SM R K365R-P R K375WP-P R K400S-SM,L H K404-P K411BL-PS R K445-TA R K450B-P-SM R K455B-P-SM R K455-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Contrail Contrail Contrail Contrail Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Kosdon/AT Contrail Gorilla Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 912 64 x 912 64 x 914 65 4 x 736 65 4 x 329 75 x 244 54 x 403 75 x 1016 75 x 364 54 x 404 54 x 404	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1386.2 2441 1785.7 1636.3 1845 1363.7 1483	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1490cc 1490cc 1170cc 11	TRA TRA TRA TRA CAR CAR CAR TRA CAR TRA TRA TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-21A K650PK-P K650PK-P K650BS-P K660-17A K661BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K675SK-18A K678-P K680R-P K680R-P K700W-P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Gorilla Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 4810 54 x 492 75 x 813 54 x 492 75 x 350 54 x 494 55 x 572 75 x 350 54 x 494 55 x 572 75 x 350 56 x 404 57 x 350 56 x 404	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1659.6 1691 1386 1791.4 2377.2 1995.2 1873.9 2352.5	1281 1135 1280 931 1400cc 1177 1182 954 1014 955 1184 1140 2050cc 1316 920 93 681 1303 745 1205 880,7 1398 1173 846,2 1321	CAR CAR TRA NAR TRA CAR CAR CAR CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C008LFX)-P R L339N-P L 339N-P L 3359M-P R L355X(1685CC125LFX)-P R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P L536Y(1685CC172L)-P R L540(1685CC172L)-P R L540(1685CC172L)-P H L575Y(2800CC172LFX)-P H L570FX(2800CC172LFX)-P H L600-P H L600-P H L600-P H L610FX(1685CCR]-P)-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Cesaroni Hypertek Cesaroni Hypertek Cesaroni Cesaroni Animal	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 76 x 498 75 x 1031 75 x 1387 75 x 1387 75 x 1387 75 x 1387 75 x 1016 98 x 394 75 x 1016 98 x 394 75 x 1058 54 x 649 75 x 486 75 x 870	2639 2789 2644.6 2793 3042.9 1 3042.9 1 2851 7 3829 4936.8 4654.6 3372 2774 3203.4 1 2994 7 4615 7 4615 8 3152 3 3161 4842 3 3161 4842 3 3161 4842 3 317 4 4951 2 2772.2 3 419.8 2 700	1685cc 1685cc 2800cc 2415 1682cc 2200cc 2200cc 2415 1682cc 2200cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2800cc 2415 1682cc 2800cc 2800cc 2800cc 2800cc 2800cc 2800cc 2415 1682cc 2800cc 2800	TRA
S K250W-P S K250W-P-SM K250LWM-P-SM H K250L-P R K260CL-P R K260CL-P R K260CL-P R K260CL-P R K260W-BML_XL R K300CL-P H K300-P H K300-P H K321-P R K327WC-P H K327WC-P H K350LWM-P-SM R K350LWM-P-SM R K350LWM-P-SM R K4656R-P R K4456-P R K4456-P	Aerotech Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Cesaroni Contrail Contrail Contrail Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Acontrail Gorilla Contrail Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni	64 x 908 54 x 673 54 x 649 54 x 991 54 x 572 54 x 849 54 x 1219 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 912 64 x 912 64 x 912 64 x 914 54 x 700 54 x 649 75 x 244 54 x 700 55 x 368 56 x 329 75 x 244 57 x 368 58 x 329 75 x 244 59 x 368 59 x 369 50 x 368 50 x 368 50 x 369 50 x 368 50 x 368 50 x 369 50 x 368 50	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1386.2 2441 1785.7 1636.3 1845 1363.7 1483 1628	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1265.7 2050cc 1490cc 1490cc 1170cc 946 1292 924.3 721.8 2050cc 1132 792 881.6 769.2 716 1400cc	TRA TRA TRA TRA CAR CAR TRA CAR TRA TRA TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-21A K650PK-21A K650PK-P K650BR-P K660-17A K661BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K675SK-18A K678-P K680R-P K680R-P K700W-P	Cesaroni Cesaroni Aerotech Animal Contrail Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Gorilla Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Contrail Aerotech Cesaroni Cesaroni Cesaroni Cesaroni Contrail Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 430 54 x 430 54 x 491 55 x 813 56 x 491 57 x 813 56 x 491 57 x 813 56 x 491 57 x 813 56 x 491 57 x 350 56 x 404 57 x 350 56 x 404 57 x 350 56 x 404 57 x 350 57 x 350	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1659.6 1691 1386 1791.4 2377.2 1955.2 1873.9 2352.5 2468	1281 1135 1280 931 1400cc 1177 1182 954 1014 955 1184 1140 2050cc 1316 920 920 880,7 1398 1400cc 880,7 1398 1173 846,2 1321 1331	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA CAR TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C008LFX)-P R L339N-P L 339N-P L 335SY(1685CC125L)-P H L35FX(1685CC125LFX)-P R L400W-PS R L425WC-PS H L475(1685CC172L)-P H L539K(1685CC172L)-P H L539K(1685CC172L)-P H L540(12800CC172L)-P H L557(1685CCR6L)-P H L575(12800CCR6L)-P H L600-P H L600-P H L600-P H L610-P H L610-P H L610-P H L610-P H L650-P R L640D-P R L640D-P R L640D-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P R L700BB-P-SM	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Cesaroni Hypertek Cesaroni Hypertek Cesaroni Cesaroni Animal Animal	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 76 x 498 75 x 1031 75 x 1387 75 x 368	2639 2789 2644.6 2793 3042.9 1 3042.9 1 2851 7 3829 4936.8 4654.6 3372 2774 3203.4 1 2994 7 4615 7 4615 8 3152 3161 4842 31131 7 4951 2772.2 3419.8 2700 2590	1685cc 1685cc 3423 2696 1837 1685cc 2800cc 2800cc 2800cc 2415 1682cc 2800cc 2200cc 200cc 2	TRA
S K250W-P S K250W-P-SM K250LWM-P-SM H K250LWH-P-SM H K260CL-P R K260CL-P R K260CL-P R K260CL-P R K260SP-P H K300-P H K300-P H K301-P K321-P K321-P K327WC-P H K327WC-P H K347B-P T K350TR-P R K350LWM-P-SM R K365R-P R K375WP-P R K400S-SM,L H K404-P K411BL-PS R K445-TA R K450B-P-SM R K455B-P-SM R K455-P	Aerotech Aerotech Loki SkyRipper Cesaroni Cesaroni Contrail Aerotech Contrail Contrail Contrail Contrail Contrail Contrail Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Animal Aerotech Cesaroni Kosdon/AT Contrail Gorilla Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni	64 x 908 54 x 673 54 x 649 54 x 499 54 x 912 54 x 579 54 x 649 75 x 1016 54 x 1220 54 x 912 64 x 912 64 x 914 65 4 x 736 65 4 x 329 75 x 244 54 x 403 75 x 1016 75 x 364 54 x 404 54 x 404	1292 1844.7 2484 2342 1607 1733 2285.1 2020.9 1684 1968 2546 1909 1570 1616 1529 1861 2374 1280.9 1675 2228.1 1596.7 1386.2 2441 1785.7 1636.3 1845 1363.7 1483	1507cc 1543 1400 938 1130cc 1149.3 1151.9 1490cc 1490cc 1490cc 1170cc 11	TRA TRA TRA TRA TRA CAR CAR TRA CAR TRA CAR TRA CAR TRA TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T	R R R R R R R R R R	K650SS-16A K650PK-21A K650PK-21A K650PK-21A K650PK-P K650PK-P K650BS-P K660-17A K661BS-P K660BS-P K670GG-P K670WC-PS K670WC-PS K675SK-18A K678-P K680R-P K680R-P K700W-P	Cesaroni Cesaroni Aerotech Animal Cesaroni Cesaroni Cesaroni Cesaroni Cesaroni Gorilla Cesaroni Contrail Aerotech Loki Aerotech Gorilla Aerotech Gorilla Cesaroni	54 x 488 54 x 488 98 x 289 54 x 492 75 x 711 54 x 572 75 x 350 54 x 492 54 x 491 75 x 368 54 x 572 75 x 1016 98 x 289 54 x 4810 54 x 492 75 x 813 54 x 492 75 x 350 54 x 494 55 x 572 75 x 350 54 x 494 55 x 572 75 x 350 56 x 404 57 x 350 56 x 404	1749.5 1997.1 2405.7 1840 2132 2437 2430.4 1379.9 1751 1806.1 2364.7 2009.6 1847 2358 1616 1514 1463 2261 1659.6 1691 1386 1791.4 2377.2 1955.2 1873.9 2352.5 2468 1740.3	1281 1135 1280 931 1400cc 1177 1182 954 1014 955 1184 1140 2050cc 1316 920 920 880,7 1398 1400cc 880,7 1398 1173 846,2 1321 1331	CAR CAR TRA NAR TRA CAR CAR CAR TRA CAR TRA CAR TRA CAR TRA TRA TRA TRA TRA TRA TRA TRA TRA T		H L200(1685CC098L)-P H L225FX(1685C008LFX)-P R L339N-P L 339N-P L 3359M-P R L355X(1685CC125LFX)-P R L400W-PS R L425WC-PS H L475(1685CC172L)-P R L480LR-P L536Y(1685CC172L)-P R L540(1685CC172L)-P R L540(1685CC172L)-P H L575Y(2800CC172LFX)-P H L570FX(2800CC172LFX)-P H L600-P H L600-P H L600-P H L610FX(1685CCR]-P)-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P R L645GR-P	Hypertek Hypertek Cesaroni Aerotech Hypertek Hypertek Contrail Cesaroni Aerotech Loki Hypertek Loki Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Hypertek Cesaroni Hypertek Hypertek Hypertek Cesaroni Hypertek Cesaroni Hypertek Hypertek Cesaroni Cesaroni Animal Animal Cesaroni	75 x 1031 75 x 1031 75 x 1031 54 x 649 98 x 302 75 x 1031 76 x 498 75 x 1031 75 x 1387 75 x 1387 75 x 1387 75 x 1387 75 x 1016 98 x 394 75 x 1016 98 x 394 75 x 1058 54 x 649 75 x 486 75 x 870	2639 2789 2644.6 2793 3042.9 3829 4936.8 4654.6 3372 2774 3203.4 2994 7 4615 3095 7 4716 7 4831 2653.4 6 3152 6 3161 4842 3161 4842 3177 4951 2772.2 3419.8 2700 2590 2765	1685cc 1685cc 2800cc 2415 1682cc 2200cc 2200cc 2415 1682cc 2200cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2415 1682cc 2800cc 2800cc 2415 1682cc 2800cc 2800cc 2800cc 2800cc 2800cc 2800cc 2415 1682cc 2800cc 2800	TRA

Designation Notes	Mfg.	Size (mm)	Impulse	Propel. Mass (grams)	Cert. Group	Not	Designation es	Mfg.	Size (mm)	Total Impulse (N-sec.)	Propel. Mass (grams)	Cert. Group		Designation Notes	Mfg.	Size (mm)	Impulse	Propel. Mass (grams)	Cert. Group
R! L780SF-PS R L789RT-PS	Loki Gorilla	76 x 498 75 x 498	3006 3251.8	1772 1796	TRA TRA		M685W-PS M700-P	Aerotech WCH	75 x 911 75 x 1473	7560.8 5592	3 4320 3951cc	TRA CAR		R M2020IM-P R M2045BS-P	Cesaroni Cesaroni	75 x 757 75 x 893	8429.4 7388	4349 3547	CAR CAR
L709N1-F3	Cesaroni	75 x 496	3759	1795	CAR		W711BS-P	Contrail	75 x 1473		3200cc			R! M2050SK-P	Cesaroni	76 x 1039			CAR
1 L800-P	Contrail	75 x 1372		3200cc	TRA		И740(2800CC200M)-P	Hypertek	75 x 1438		2800cc			R M2075SS-P	Cesaroni	75 x 893	6286.6		CAR
R L805WH-P	Cesaroni	54 x 649	2833	1640	CAR	R	M745WC-PS	Gorilla	75 x 785	5368	2900	TRA	Ш	R! M2080SK-P	Cesaroni	75 x 1025	6827.3	4107	CAR
R! L820SK-P	Cesaroni	75 x 486	2945.6		CAR		M750W-P	Aerotech	98 x 732	9325	5300	NAR		R M2100G-P	Aerotech	98 x 598	7802	3948	TRA
L840CT-P	Loki	78 x 499	3889.9		TRA		M795-P	Cesaroni	98 x 702	10133	4892	CAR		R M2150RL-P	Cesaroni	75 x 893	7455.4		CAR
R L850W-P R L851WH-P	Aerotech Cesaroni	75 x 531 75 x 486	3642 3683.2	2075 2110	TRA CAR		И840WH/LB-Р И900-Р	Cesaroni Loki	75 x 879.3 76 x 785	3 7521.2 5332.4		CAR TRA		R! M2200SK-P-SM R M2245-P	Animal Cesaroni	75 x 1039 75 x 1025		3766 5074	NAR CAR
L875DM-PS	Aerotech	54 x 653	3887.4		TRA		M900-P	RATTworks	69 x 1828					R M2250CS-P	Cesaroni	75 x 621	5472.2		CAR
L890SS-P	Cesaroni	75 x 530	3762	2670	CAR		M956(3500CCRGM)-P		98 x 1166		3500cc		Т.	H M2281BF-P	Contrail	75 x 1524	-	5300cc	
L900RR-P	Animal	75 x 497	3450	1771	NAR		M960FX(2800CC300MFX)-P		75 x 1438	5126	2800cc	TRA		R M2400T-P	Aerotech	98 x 597	7717	3692.6	
! L900DM-PS	Aerotech	75 x 653	3787	2594	TRA		M1000(4630CCRGM)-P		98 x 1405		4630cc			R M2500T-P	Aerotech	98 x 751	9671	4711.2	TRA
L910CS-P L930LWB-P-SM	Cesaroni	75 x 350	2856.1	1270	CAR TRA		M1001(5478CCRGM)-P		98 x 1438		547800			R M2500GG-P-SM R M2505-P	Animal	75 x 1039	7800 7450	4248	NAR CAR
L930LWB-P-3W	Loki Cesaroni	75 x 499 54 x 649	3587 3146.8	1836 1567	CAR		<mark>/11010FX(4630CCRGMFX)-F</mark> //1015FX(3500CCRGMFX)-F		98 x 1405 98 x 1166		4630cc			R M2505-P R M2550LB-P-SM	Cesaroni Loki	98 x 579 76 x 785	6502	3339 3065	TRA
L952W-P-SM	Aerotech	98 x 427	4656	2749.7	TRA		M1025WC-P	Gorilla	98 x 870	9581	5329	TRA		H M2700BS-P	Contrail	98 x 1524		5300cc	
L970(2800CC300M)-P	Hypertek	75 x 1438	5098	2800cc	TRA	H I	W1040FX(4630CCRGMFX)-F	Hypertek	98 x 1438	10098	4638cc	TRA		H M2800BG-P	Contrail	98 x 1524	6060	5300cc	TRA
L985-P	Cesaroni	54 x 728	2664.6		CAR		M1060-P	Cesaroni	98 x 548	7441	3622	CAR		Ra M2900R-P	Kosdon/AT	75 x 1039		3755	NAR
L985GT-PS	Gorilla	75 x 497.		1875	TRA		M1075DM-PS	Aerotech	98 x 649	5571	3846	TRA		R M2925WC-PS	Gorilla	75 x 1039			TRA
L990BS-P L995RL-P	Cesaroni Cesaroni	24 x 649 75 x 486	2771 3618	1369.4 1912.5	CAR CAR		W1085WC-PS W1101WH-P	Gorilla Cesaroni	75 x 1039 75 x 621	9 6958 5197.6	3932 3 2993	TRA CAR		R M3000ST-P R M3000LW-PS	Animal Loki	75 x 1039 76 x 1039		3819 4350	TRA TRA
L1000W-18A	Aerotech	54 x 635	2666.3		TRA		W1160GR-P	Cesaroni	75 x 757	5880.2		CAR		R M3100WT-P	Cesaroni	75 x 757	6117.8	2903	CAR
L1000S-P	Kosdon/AT	54 x 728	2592	1301	TRA		V1200SF-PS	Loki	76 x 785	5122.6		TRA		R M3400WT-P	Cesaroni	98 x 702	9994.5		CAR
L1030-P	Cesaroni	54 x 649	2787.9	1516	CAR	R	M1230IM-P	Cesaroni	75 x 621	5506.5	2900	CAR	Ш	R M3500R-P	Aerotech	75 x 1039	7310	3755	NAR
! L1040DM-PS	Aerotech	75 x 653	3769	2602	TRA	R	V1290WH-P	Cesaroni	98 x 548	7649.3	4295	CAR		R M3700WT-P	Cesaroni	75 x 803	6800.3	3019	CAR
L1040R-PS	Loki	54 x 727	3707.7	1746	TRA		M1297W-P	Aerotech	75 x 665	5416.6		TRA		R M4500ST-P	Aerotech	98 x 7680		3425	TRA
L1050BS-P L1060GG-P-SM	Cesaroni	75 x 786	3727	1774	CAR NAR		M1300IM-P	Cesaroni	75 x 757	6438.2		CAR TRA		R M4770-P	Cesaroni	98 x 548	7312.4	379	CAR
L1065BL-BS	Animal Gorilla	75 x 497 75 x 787	3622.6 4209.7	1917.8 5329	TRA		M1305M-PS M1315W-P	Aerotech Aerotech	98 x 649 75 x 801	6891 6713.5	4080 3499.4	TRA	١.	R N1000W-P	Aerotech	98 x 1046	14126	7925	NAR
L1080BB-P	Animal	75 x 497	3700	1717	NAR		W1340W-PS	Aerotech	98 x 556	7368.9		TRA		R N1100-P	Cesaroni	98 x 1046		6790	CAR
L1090SS-P	Cesaroni	75 x 665	4815	3490.3	CAR		W1350WW-P-SM	Animal	75 x 785	5725	2927.3	NAR		R N1560WH-P	Cesaroni	98 x 1239		9946	CAR
L1090W-PS	Aerotech	54 x 623	2671.3	1468	TRA	S	W1350W-PS	Aerotech	75 x 622	5178.2	4808	TRA		R N1720WC-PS	Gorilla	98 x 1213	14236	7456	TRA
L1100RR-P-SM	Animal	54 x 728	2576	1346	NAR		M1355RT-PS	Gorilla	75 x 787	5164.6		TRA		R N1800WH-P	Cesaroni	98 x 702	10367	5727	CAR
L1111ST-P	Animal	75 x 497	3480	1642	TRA		M1400-P	Cesaroni	75 x 757	6251	2992	CAR	٠.	R N1975GR-P	Cesaroni	98 x 1010		8560	CAR
L1115-P L1150R-P	Cesaroni Aerotech	75 x 621 75 x 530	5015 3517	2394 1902	CAR TRA		W1401WH-P W1419W-P	Cesaroni Aerotech	75 x 757 98 x 579	6268.3 7755.5		CAR TRA		R N2000W-P R N2020WW-P	Aerotech Animal	98 x 1046 98 x 870	13347 10281	7752.6 5160.9	TRA NAR
L1150WC-PS	Gorilla	75 x 498	3575.7	1974	TRA		V11415VV-F V11450-P	Cesaroni	98 x 702	9955	4830	CAR		R N2200PK-P	Cesaroni	98 x 1010		6122	CAR
L1170FJ-PS	Aerotech	75 x 665	4229	2805	TRA		M1450W-P	Kosdon/AT	75 x 1039		4150	NAR		R N2500-P	Cesaroni	98 x 1010		6778	CAR
L1222SF-P	Contrail	75 x 1524	3895	3200cc	TRA	R	M1480RR-P-SM	Animal	75 x 785	5800	3000	NAR	Ш	R N2501WH-P	Cesaroni	98 x 1010	15227	8496	CAR
L1276RR-PS	Animal	54 x 728	2729	1475	TRA	R	M1500G-P	Aerotech	75 x 653	5220	2631	TRA		R N2540GR-P	Cesaroni	98 x 1239	17907	10700	CAR
! L1290SK-P	Cesaroni	76 x 785	4701.1	2705	CAR		W1520BS-P	Cesaroni	98 x 548	7579	3602	CAR		R N2600GG-P	Animal	98 x 870	10607	5591.4	NAR
L1300R-P L1300BB-P-SM	Aerotech Animal	98 x 443 54 x 728	4567 2672	2632 1314	TRA Nar		W1540IM-P W1545GR-P	Cesaroni Cesaroni	75 x 757 75 x 1025	6819.4 8186.7		CAR CAR		R! N2600SK-P R N2700BB-P	Cesaroni Animal	98 x 1010 98 x 870	11077 11452	6618 5147.1	CAR NAR
L1350CS-P	Cesaroni	75 x 486	463.1	1905	CAR		W1550R-P	Aerotech	75 x 801	5600	3170	TRA	ш	R N2712WC-PS	Gorilla	98 x 870	10813	5286	TRA
L1355SP-P	Cesaroni	75 x 621	4025.5		CAR		W1560WT-P	Cesaroni	98 x 394	5342	2452	CAR	Т.	R N2800WW-P	Animal	98 x 1213			NAR
L1390G-PS	Aerotech	78 x 531	3948.7		TRA		M1565BL-P	Gorilla	98 x 870	7533	4992	TRA		R N2850BS-P	Cesaroni	98 x 1010		6759	CAR
L1395-P	Cesaroni	75 x 621	4895.4	2364.9	CAR	H	M1575-P	Contrail	98 x 1524	6547	5300cc	TRA		R! N2876SK-PS	Animal	98 x 122	11940	13675	TRA
L1400SK-P	Animal	75 x 785	4744	2829.4	NAR		M1590CL-P	Cesaroni	75 x 893	7544.6		CAR		R N2900CL-P	Cesaroni	98 x 1239			CAR
L1400F-P	Kosdon/AT	54 x 728	2640	1248	TRA		M1600R-P	Aerotech	98 x 579	7084	4026	TRA		R N3180-p	Cesaroni	98 x 1010		7460	CAR
L1400LW-P-SM L1400M-PS	Loki Aerotech	54 x 736 75 x 653	2850.6 4900.9		TRA TRA		W1610BL-PS W1630TT-P	Gorilla Cesaroni	75 x 1039 75 x 1039			TRA CAR		R N3300R-PS R N3301WH-P	Aerotech Cesaroni	98 x 1059	1.46 14041 19318		TRA CAR
L1400W-F3	Cesaroni	75 x 757	4828.3		CAR		W1665WC-PS	Gorilla	75 x 787		5579	TRA		R! N3400SK-P	Cesaroni	98 x 1239			CAR
L1420R-P	Aerotech	75 x 443	4603	2560	TRA		M1670BS-P	Cesaroni	75 x 757	6041.7		CAR		R N3800BS-P	Cesaroni	98 x 1239			CAR
L1428SF-P	Contrail	76 x 1753		3200cc	TRA	R	M1675PK-P	Cesaroni	75 x 757	6162	3019	CAR		R N3800LW-PS	Loki	102 x 104			TRA
L1482LB-P-SM	Loki	54 x 497	3882	1839	TRA		M1730SK-P	Animal	98 x 870	8115	4945.2	NAR		R N4000BB-P	Animal	98 x 1213		7565.7	NAR
L1500T-P	Aerotech	98 x 665	5089.3		TRA		M1770SK-P	Cesaroni	75 x 893	5933.4		CAR		R N4100RL-P	Cesaroni	98 x 1239			CAR
L1520T-PS L1685SS-P	Aerotech	75 x 518 75 x 757	3715.9 5069.3		TRA CAR		W1780NT-PS W1790SK-P	Aerotech Cesaroni	75 x 653 98 x 702	5783 8088.9	2560 4706	TRA CAR		R N4800T-P R N5600WT-P	Aerotech Cecaroni	98 x 1201 98 x 1010		9570.8 6363	TRA CAR
L1720WT-P	Cesaroni Cesaroni	75 x 486	1688	2660	CAR		W17905K-P W1800FJ-P	Aerotech	98 x 702	8200	9163	TRA		R N5800CS-P	Cesaroni Cesaroni	98 x 1010			CAR
L2050LW-PS	Loki	54 x 1041			TRA		V1800BS-P	Cesaroni	98 x 702	9867.7		CAR		R N10000-P	Cesaroni	98 x 1010			CAR
L2200G-P	Aerotech	75 x 653	5104	2518	TRA		V1810RL-P	Cesaroni	75 x 757	6132	3196	CAR							
L2300G-P	Aerotech	54 x 728	2756	1310	TRA		M1830CS-P	Cesaroni	75 x 621	5603.7		CAR		R 02645BL-P	Gorilla	152 x 120		15149	TRA
L2375WT-P	Cesaroni	75 x 621	2225	4864	CAR		M1845NT-PS	Aerotech	98 x 597.9			TRA		R! 03700SK-P	Cesaroni	161 x 957		17157	CAR
L2500ST-P	Aerotech	98 x 5120		2313	TRA		M1850W-P	Aerotech	75 x 924	7680	4009	TRA		R 04900BS-P	Cesaroni	161 x 957			CAR
L2525GF-P L3150-P	Contrail Cesaroni	75 x 1524 98 x 394	4681.4 4807.8		TRA CAR		W1850GG-P W1882LW-PS	Animal Loki	75 x 781 76 x 787	5920 6303	3375 3130	TRA TRA		R 04925WC-P R 05100-P	Gorilla Cesaroni	152 x 121 161 x 803		16575 13245	TRA CAR
L3130-P L3200-P	Cesaroni Cesaroni	96 x 394 75 x 486		1555	CAR		VI 1002LVV-P5 VI 1890-P	Cesaroni	98 x 702	9875.6		CAR		R 05800-P	Cesaroni	161 x 754		13950	CAR
L11000W-18A	Aerotech	54 x 635		2194	TRA		V11900BB-P	Animal	75 x 785	6100	2733	NAR		H 06300-P	Contrail	156 x 182		15000c	
							M1939W-P	Aerotech	98 x 732	10482		TRA		R 08000-P	Cesaroni	161 x 957			CAR
M520-P	Cesaroni	98 x 548	7278.5	3713	CAR	R	W1969SF-PS	Loki	76 x 1038	7295.8		TRA		S 025000VM-P	Cesaroni	132 x 140		14471	CAR
M650W-P	Aerotech	75 x 801	5964	3351	NAR	R	M2000R-P	Aerotech	98 x 732	9218	5368	TRA							

ROCKET SCIENTIST? Connect With a local NAR Section Near You!

Alabama

Huntsville Area Rocketry Association (HARA) #403

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South East Alabama Rocketry Society (SEARS) #572

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Birmingham Rocket Boys (BRB) #665

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Sky Scrapers (SKYS) #781

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Alaska

Alaska Northstars (AK N*S) #726

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Arctic Amateur Rocketry Council (AARC) #764

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Airdrie Space Science Club (ASSC) #794

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Arizona

Superstition Spacemodeling Society (SSS) #506

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Southern Arizona Rocketry Association (SARA) #545

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Hopi Hawks (Hopi Hawks) #636

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Eagle Aerospace (EA) #783

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Gila Valley Rocketry Association (GVRA) #814

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Arkansas

Reddie Rockets #777

Arkadelphia, Arkansas Rick McDaniel, mcdanir@hsu.edu (870) 230-5170 http://www.hsu.edu/Academics/Programs/ Physics/ReddieRockets.html

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Southern California Rocket Association (SCRA) #430

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Livermore Unit of the NAR (LUNAR) #534

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Rocketry Organization of California (ROC)

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Sacramento Area Rocketry Group (SARG) #557

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AIAA OC Rocketry (AOCR) #718

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Southern Kern Aeronautics & Rocketry (SKAR) #779

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Orange County Rocket Society (OCRS) #784

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AFE Rocketry (AFE) #791

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San Fernando Valley Rocketry (SFVR) #817

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Colorado

Colorado Rocketry Association of Space Hobbyists (CRASH) #482

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Colorado Springs Rocket Society (COSROCS) #515

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San Luis Valley Rocketeers (SLV ROC) #774

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CloudBusters (CB) #807

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Colorado OrbitMakers: Experimental Rocket Design & Development Crew (COM) #810

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Connecticut

CATO Rocketry Club (CATO) #581

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Delaware

SEDS at the University of Delaware (SEDS) #815

Newark, Delaware Michelle Hallenbeck, mkh@udel.edu https://studentcentral.udel.edu/organization/

Florida

Spaceport Rocketry Association (SRA) #342

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Florida Spacemodeling Association (FSA) #481

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Northeast Florida Association of Rocketry (NEFAR) #563

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South East Alabama Rocketry Society (SEARS) #572

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Rockets of Orlandos Community Kids (ROCK) #622

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Florida Association of Spacemodeling Hobbyists (FLASH) #688

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Broward Area Rocketry Society (BARS) #717

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Homestead Public Rocketry Club (HPRC) #745

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Regional Orlando Applied Rocketry (ROAR) #795

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Georgia

Southern Area Rocketry (SoAR) #571

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South East Alabama Rocketry Society (SEARS) #572

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Society of Tellus Amateur Rocketry (STAR-GA) #737

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Hawaii

Hawaii Kai Rocketeers (HKR) #782

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Center for Aerospace Education Launch for University Students (CAELUS) #800

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Society of High Altitude Rocket Kids (SHARKs) #811

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Idaho

Treasure Valley Rocketry Association (TVRA) #603

Boise, Idaho Rick Bier, rick@rbier.us (208) 407-2202 http://www.tripoliidaho.org/



Illinois

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Central Illinois Aerospace (CIA) #527

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Prairie State Rocketry (PSR) #528

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Fox Valley Rocketeers (FVR) #683

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Illinois Society of Amateur Rocketry (ISAR) #696

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Illinois Rocketry Society (IRS) #708

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Summit City Aerospace Modelers (SCAM) #282

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Launch Crue (Launch Crue) #519

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A Method Of Reaching Extreme Altitudes (AMOREA) #540

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Rocketeers of Central Indiana (ROCI) #625

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Elkhart Rocketry Group (ERG) #813

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Kansas

Kansas Organization for Space Modeling (KOSMO) #427

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Emerald City Rocket Club (ECRC) #751

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Kentucky

Bluegrass Rocketry Society (BluesRockS) #657

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South Louisiana Rocketry (SOLAR) #596

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Great Raft Rocketeers (GRR) #788

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Maine

Maine Missile Math & Science Club (MMMS Club) #727

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NAR Headquarters Astromodeling Section (NARHAMS) #139

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Massachusetts

Central Massachusetts Spacemodeling Society (CMASS) #464

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Nite Owl Rocketry Gild (NORG) #799

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Michigan

Huron Valley Rocket Society (HUVARS) #463

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Jackson Model Rocketry Club (JMRC) #620

Jackson, Michigan Scott Miller, scott@sfsmindustries.com (269) 370-7929 http://www.jmrconline.org/

Muskegon Michigan Area Rocketry (MMAR) #702

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Michiana Rocketry (MR) #721

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Tuskegee Airmen Rocket Club (TANHMRC) #816

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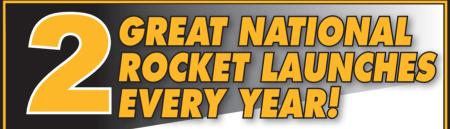
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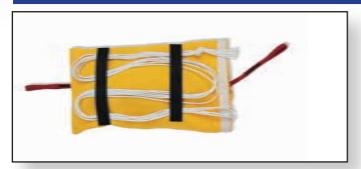
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Dinochutes

Dinochutes carries two sizes of deployment bags that are intended for use with mid-power sized rockets. Their smaller bag measures approximately $4" \times 7"$ and is intended to be used with BT-80 sized body tubes, or any body tube that is at least 2.5" in diameter. The larger bag measures approximately $4.5" \times 9"$ and is intended to be used with 3" sized body tubes.

Both deployment bags are constructed from Nomex, but is not intended to be used without additional protection such as a Nomex parachute protector and/or cellulose insulation (aka "dog barf"). This is because the nylon strap can melt under extreme heat.

The nylon strap is continuous and provides loops at both ends. The small deployment bag retails for \$18.00, while the larger bag sells for \$20.00. For more information about Dinochutes offerings and pricing, check out their website at www.dinochutes.com.



Aerospace Speciality Products

Aerospace Speciality Products has two new kits that are sure to be big hits with the scale crowd.

The first new kit is the Aerobee 100, or Aerobee Junior. The kit has an accurate scale outline but is also a fairly easy build. The Aerobee 100 is 1.89" in diameter and about 2.5 feet tall and features thru-the-wall laser-cut plywood fins (with optional balsa laminations), big balsa nose cone, pre-rounded basswood conduits, steel cable shock cord mount, and water slide decal. Weighing in at approximately 9 ounces, this kit would make a great introduction to mid-power rocketry and flies on a wide range of 29mm F and G motors. Estimated altitudes are 925 feet on an E16-4, up to as high as 3.740 feet on a G80-10.

The Aerobee 100 retails for \$49.95.

The second kit in this new offering is the Aerobee 300. This new kit is 1.89" in diameter and over three feet tall. The kit fea-

tures thru-the-wall laser-cut plywood fins (with optional balsa laminations), balsa nose cone and transition, pre-rounded basswood conduits, steel cable shock cord mount, and water slide and self-adhesive decals.

Weighing in at only 10 ounces this model, the Aerobee 300 will log some impressive flights on E through *G* impulse motors as well. Also, with an accurate scale outline, this kit is still easy to build, but allows room for the modeler to add additional details in desired.

The Aerobee 300 kit retails for \$59.95.

For these and other products in the Aerospace Specialty Products line, visit their website at www.asp-rocketry.com.

Altaira Rocketry



Altaira Rocketry has announced its first rocket kit: the Soviet N1 Moon Rocket. The kit is derived from the research of Matthew Johnson in Dayton, with Nick Stevens in London, and the legendary historian Alex Shliadinski in St. Petersburg, who certified the kit design. The kit was deemed a Skill Level 6, a first in rocketry.

As Tim Van Milligan of Apogee Components stated, "This kit originating from Altaira Rocketry is unique because before this there was nothing on

the N1 available in model rocketry."

The N1 kit passes the ejection charge through the three-stage rocket, thereby avoiding all of the inherent problems of stopping the charge at the first stage, something often done due to the unique Soviet inter-stage design. With a scale of 1/122 scale (34 inches tall), it was determined that the small gap associated with the inter-stages was so small that a pass-through tube was acceptable.

The inherent conical design of the N1 allows for no fins to be added, with the proper nose-weight in the large fourth stage area assuring a stable flight. The addition of two thirty-inch chutes allows for a safe landing.

The kit includes laser cut, vacuum formed, 3D printed, and cast resin parts. The conical nature of the N1 requires a great deal of shroud work. All of the shrouds include color-coded guides for part placement.

The N1 kit includes a thirty-, full-color Overview, giving the modeler ample information for the build and then a forty-page full-color Instruction Pack with step-by-step photographs.

The N1 is powered by six D12-5 motors. It is easily converted to 29mm, tube supplied.

The kit is available from Apogee Components and at the Altair Rocketry Store on eBay. The first run of twenty-five was sold out in December after the first ad appeared in *Sport Rocketry* in November. The next run will be available in January at a cost of \$148.88.







