

Mars Science Laboratory – Curiosity Rover

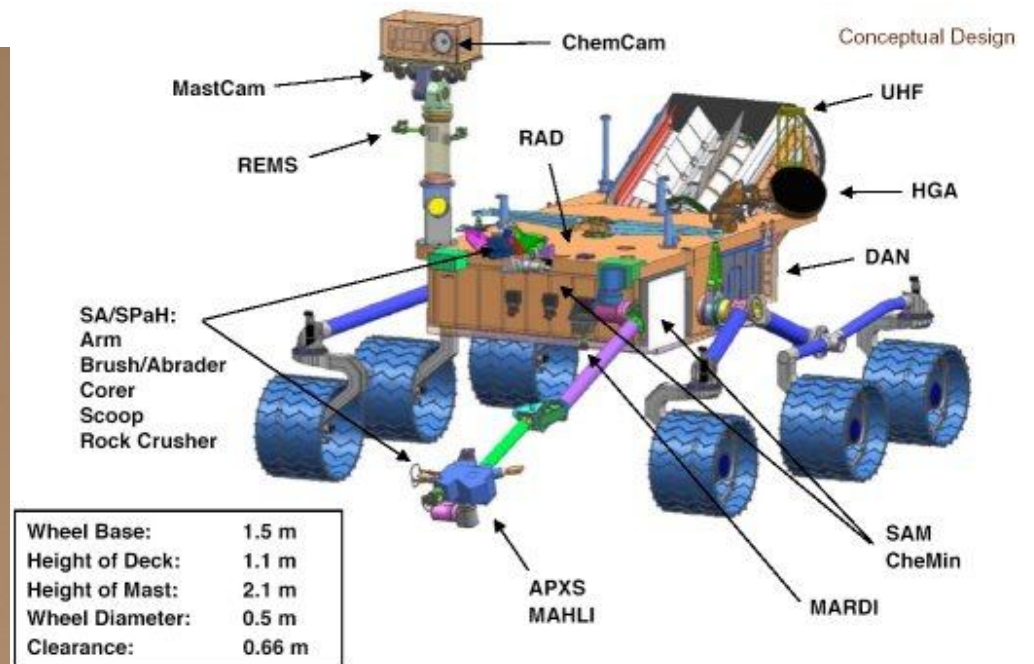
1:12 scale

The Mars Science Laboratory is planned to land on Mars in 2012 and will operate for at least one Mars year (approximately two Earth years). Scheduled to launch in the fall of 2011, Mars Science Laboratory is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the red planet. Mars Science Laboratory is a rover that will assess whether Mars ever was, or is still today, an environment able to support microbial life. In other words, its mission is to determine the planet's "habitability."

To find out, the rover will carry the biggest, most advanced suite of instruments for scientific studies ever sent to the Martian surface. The rover will analyze dozens of samples scooped from the soil and drilled from rocks. The rover's onboard laboratory will study rocks, soils, and the local geologic setting in order to detect chemical building blocks of life (e.g., forms of carbon) on Mars and will assess what the Martian environment was like in the past.

Mars Science Laboratory will rely on new technological innovations, especially for landing. The spacecraft will descend on a parachute and then, during the final seconds prior to landing, lower the upright rover on a tether to the surface, much like a sky crane. Once on the surface, the rover will be able to roll over obstacles up to 75 centimeters (29 inches) high and travel up to 90 meters (295 feet) per hour.

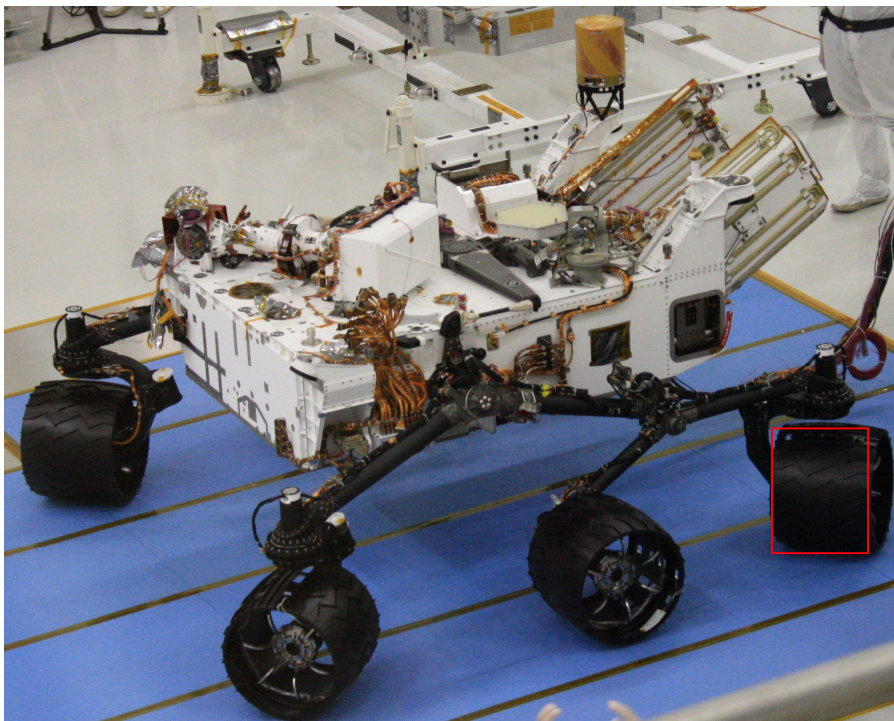
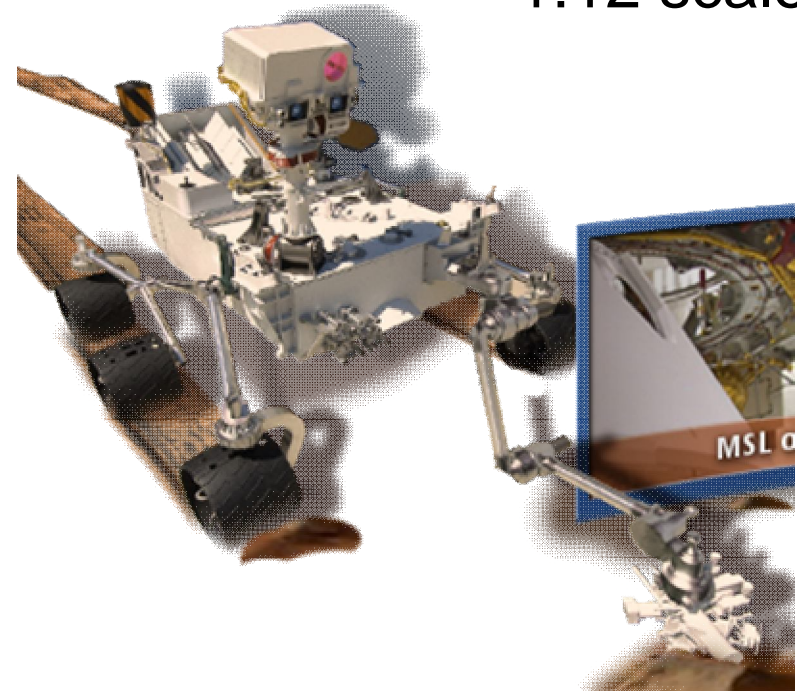
The rover will carry a radioisotope power system that generates electricity from the heat of plutonium's radioactive decay. This power source gives the mission an operating lifespan on Mars' surface of a full Martian year (687 Earth days) or more, while also providing significantly greater mobility and flexibility as well as a bigger science payload while not relying on varying seasonal sunshine for power.



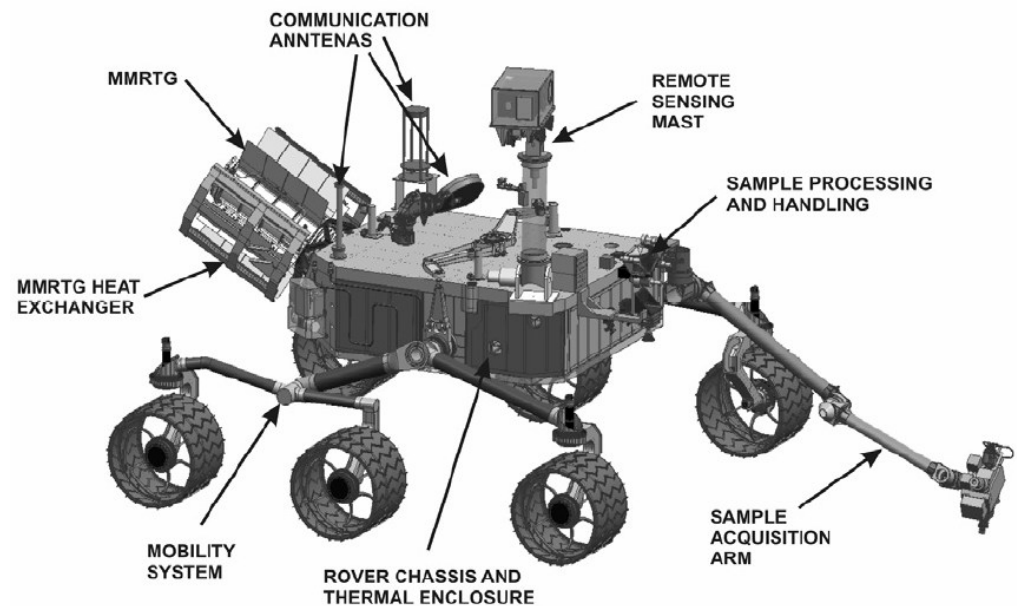
Mars Science Laboratory – Rover



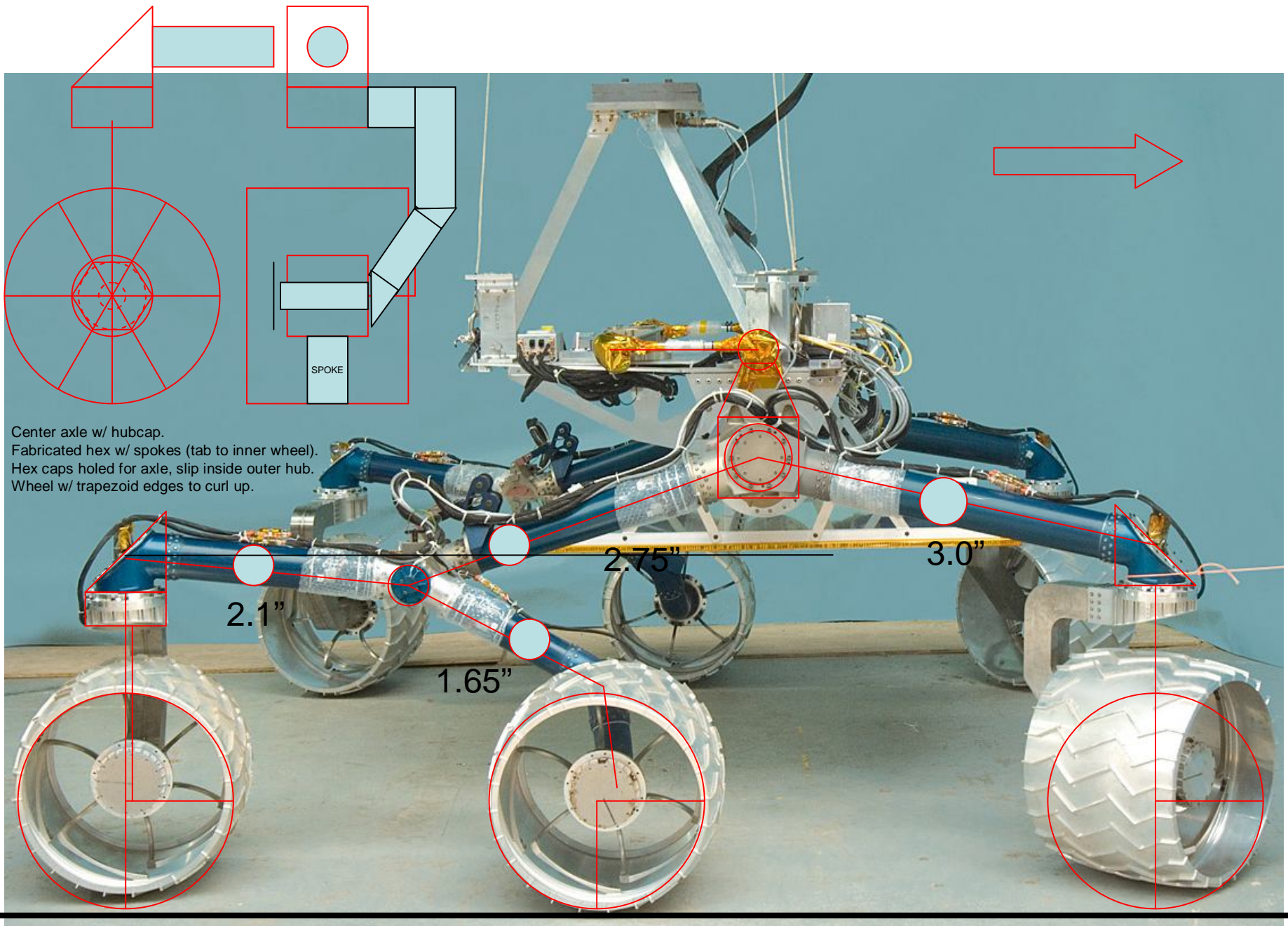
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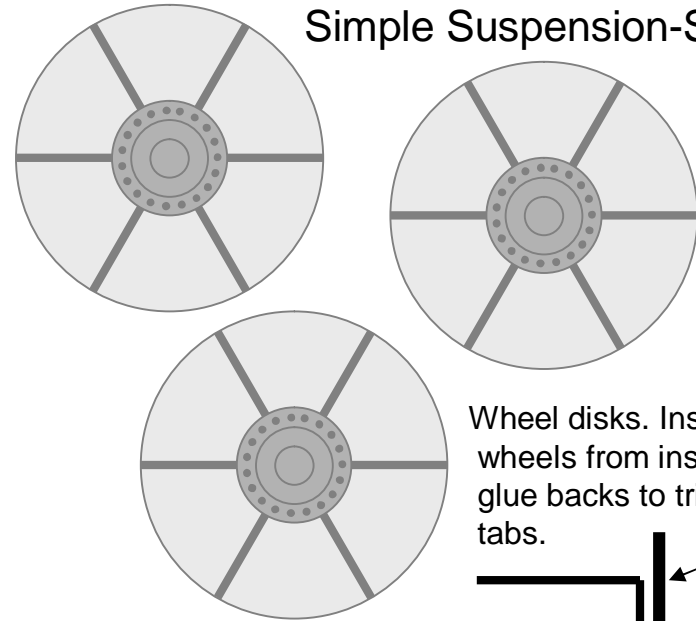
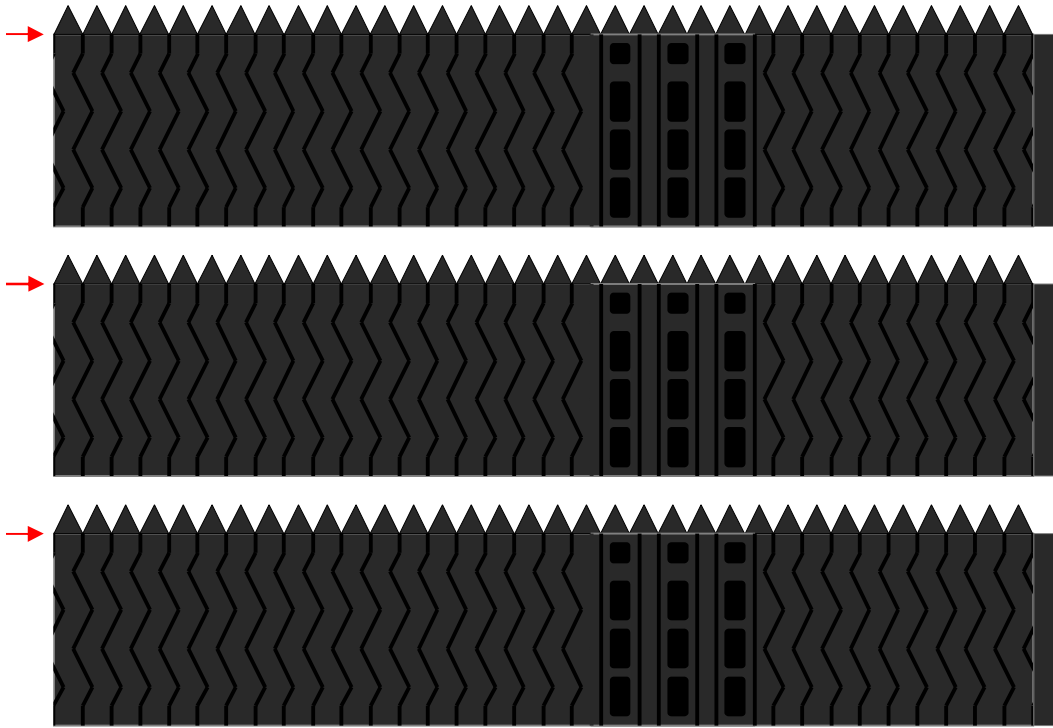
Wheel 50cm=19.7"=1.64 scaled inches



Mars Science Laboratory – Suspension



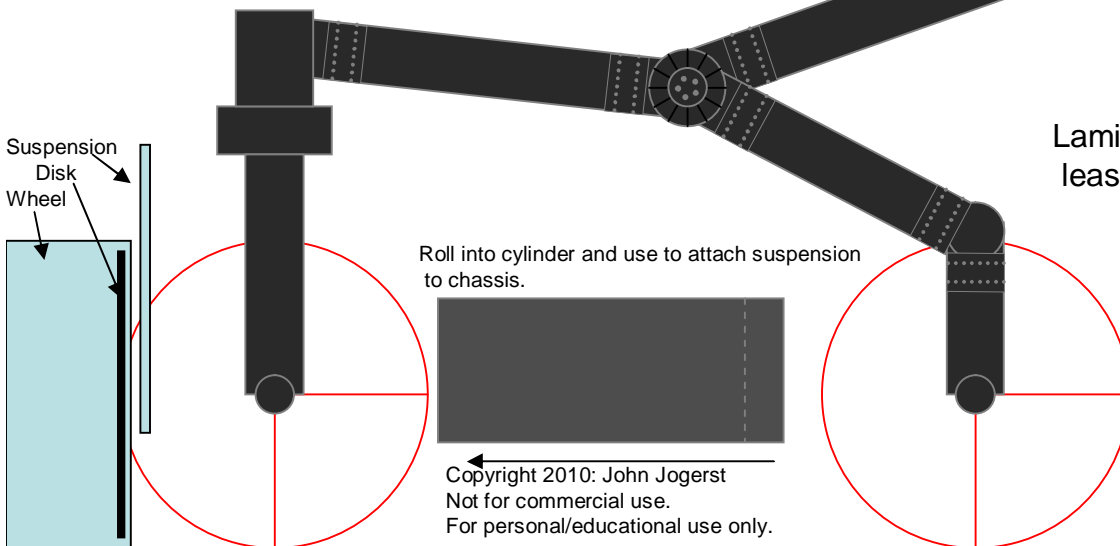
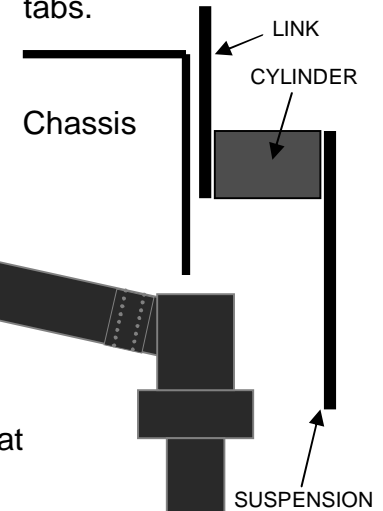
Mars Science Laboratory Simple Suspension-Stb



Wheel disks. Insert into wheels from inside and glue backs to triangular tabs.

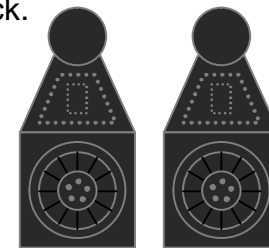
Color back of part (inside of wheel) black.

Roll wheels into cylinder and glue. Bend inner triangular tabs down, insert wheel disk inside and glue tabs to back of disk.



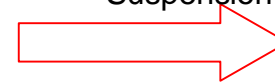
Roll into cylinder and use to attach suspension to chassis.

Laminate to stiff card to make part at least 2mm thick.

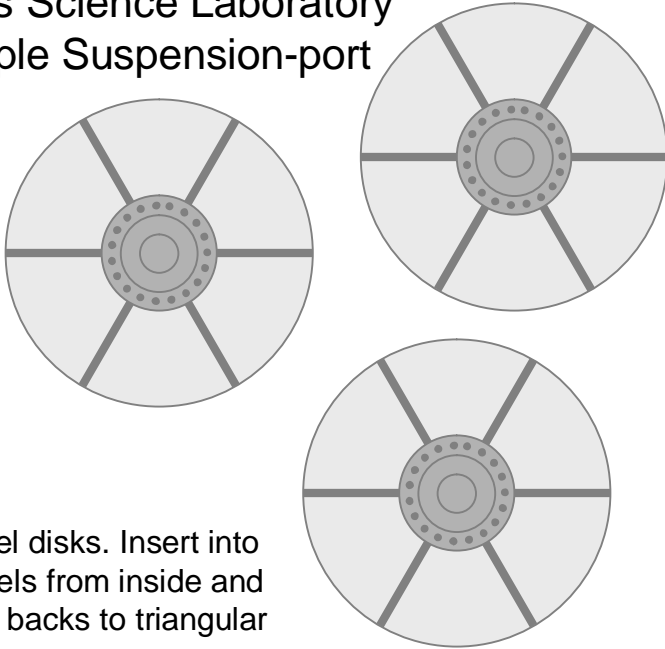


Suspension links

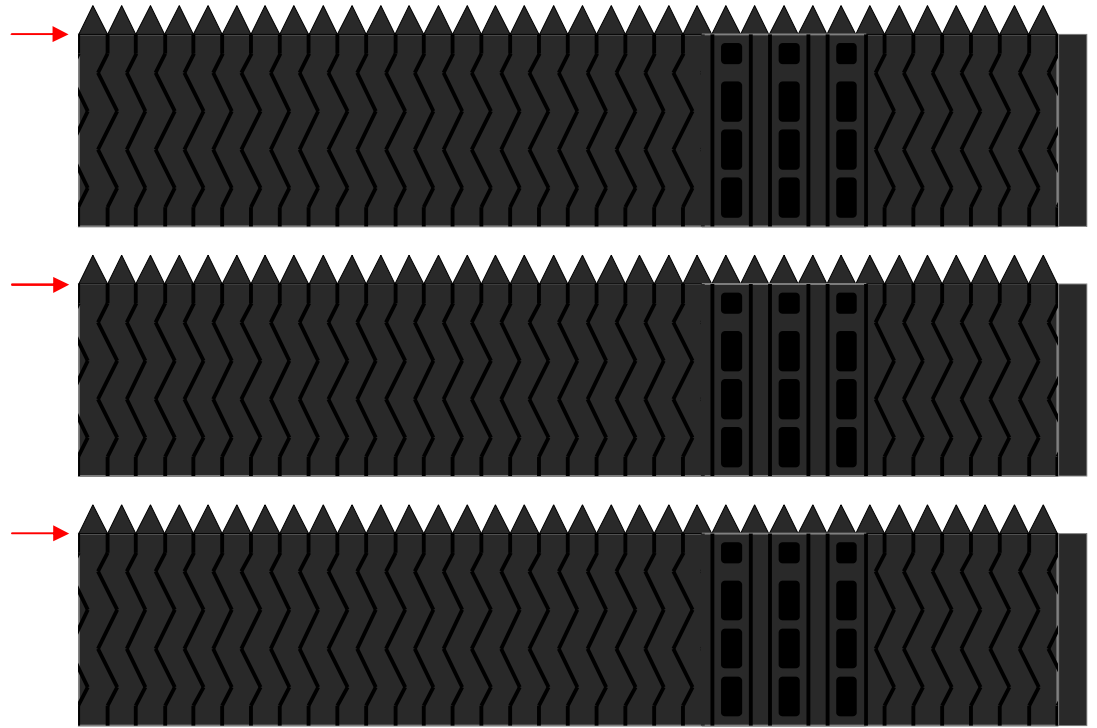
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Mars Science Laboratory Simple Suspension-port

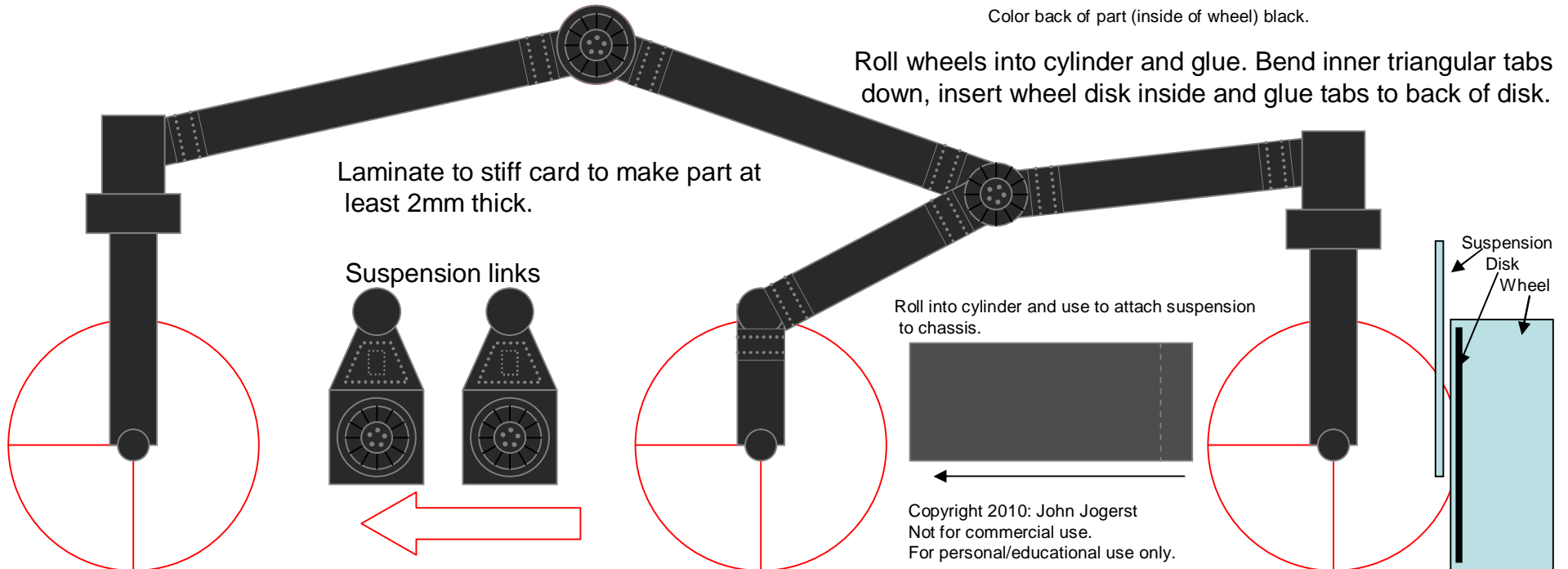


Wheel disks. Insert into wheels from inside and glue backs to triangular tabs.



Color back of part (inside of wheel) black.

Roll wheels into cylinder and glue. Bend inner triangular tabs down, insert wheel disk inside and glue tabs to back of disk.



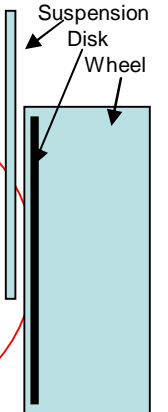
Laminate to stiff card to make part at least 2mm thick.

Suspension links

Roll into cylinder and use to attach suspension to chassis.



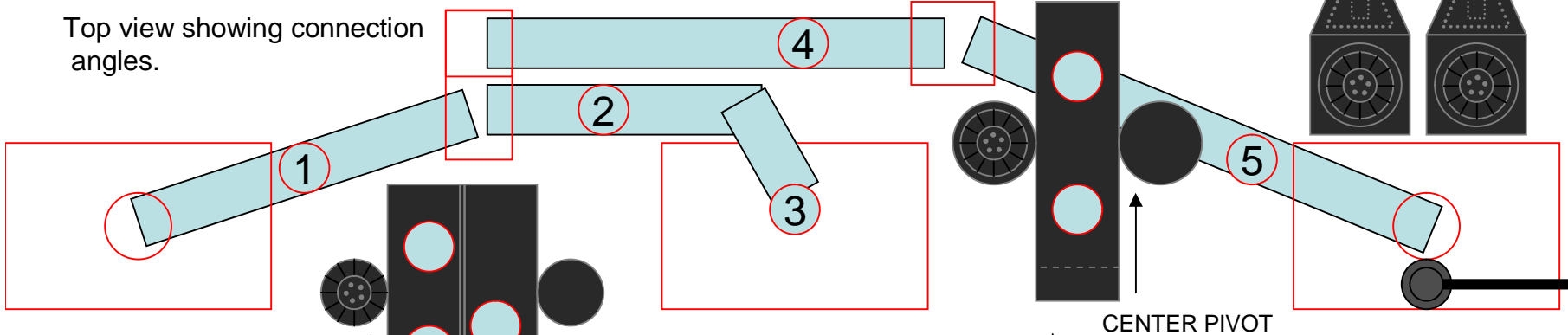
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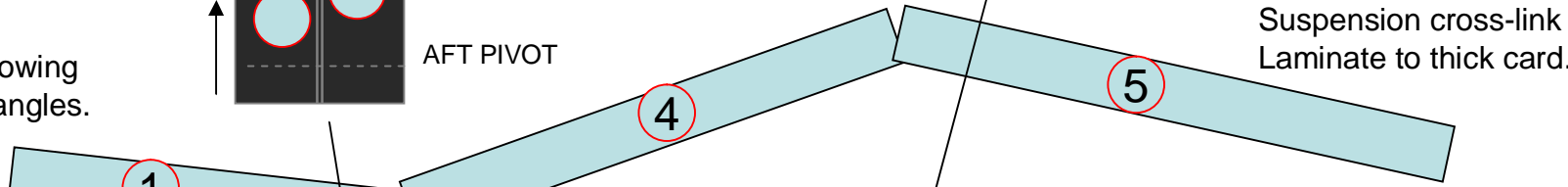
Mars Science Laboratory – Detailed Suspension starboard side

Study rover pictures carefully to see how the attachment angles provide clearance and align wheels.

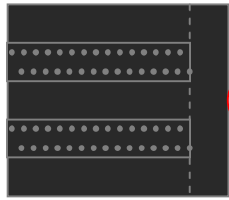
Top view showing connection angles.



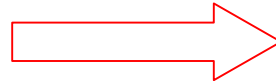
Side view showing connection angles.



Roll cylinders.
Glue up 1,2,3 using outer holes in aft pivot.
Glue up 4,5 to center pivot.
Attach wheel assemblies, then glue fore and aft suspension together using aft pivot and ensure wheels are in line.



Cut tube ends to fit and glue.



2.75"

3.0"

2.1"

1.65"

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Mars Science Laboratory – Detailed Suspension portside

CENTER PIVOT

Top view showing connection angles.

AFT PIVOT

Side view showing connection angles.

Roll cylinders.
 Glue up 1,2,3 using outer holes in aft pivot.
 Glue up 4,5 to center pivot.
 Attach wheel assemblies, then glue fore and aft suspension together using aft pivot and ensure wheels are in line.

Cut tube ends to fit and glue.

ROLL

3.0"

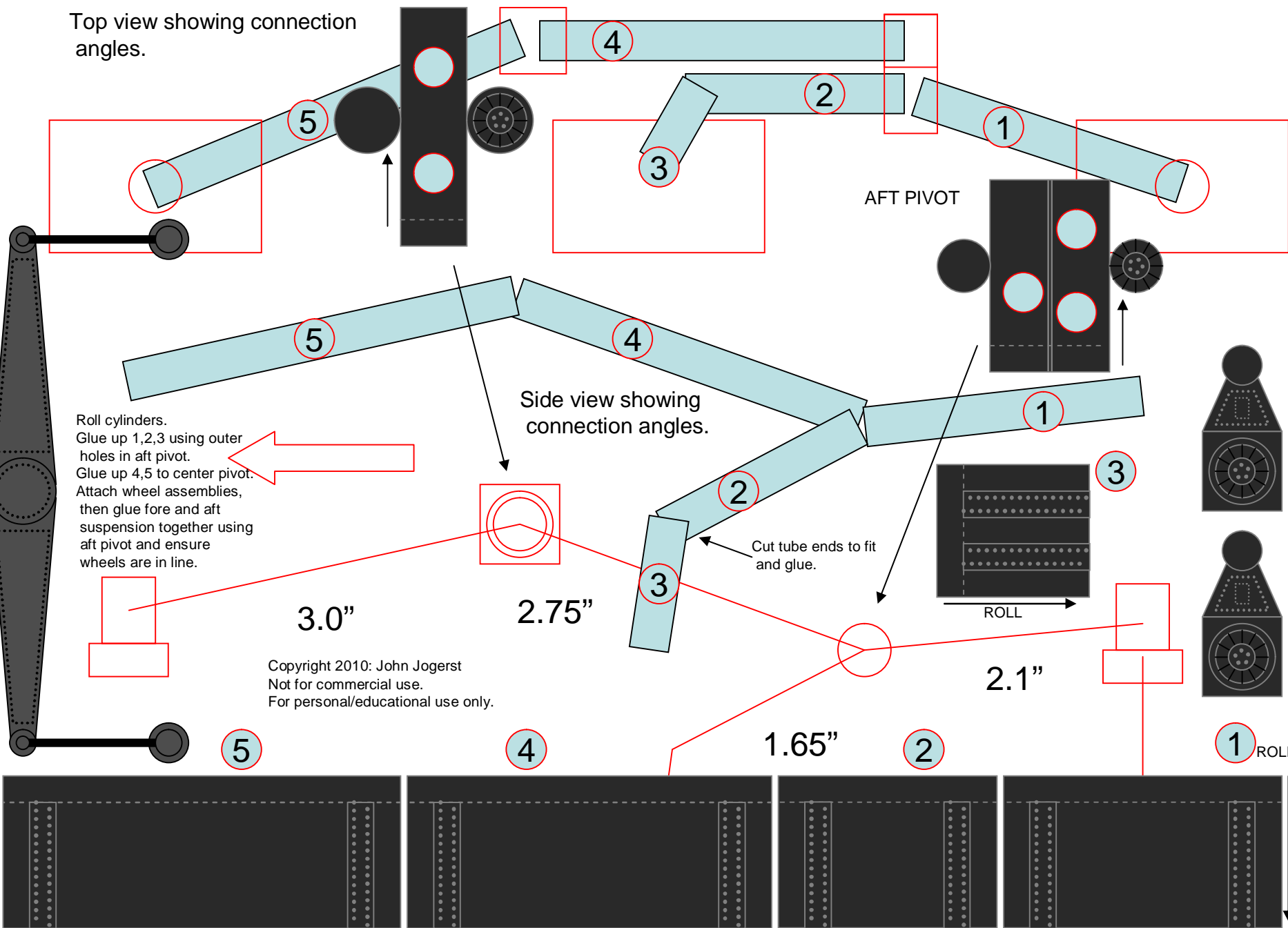
2.75"

2.1"

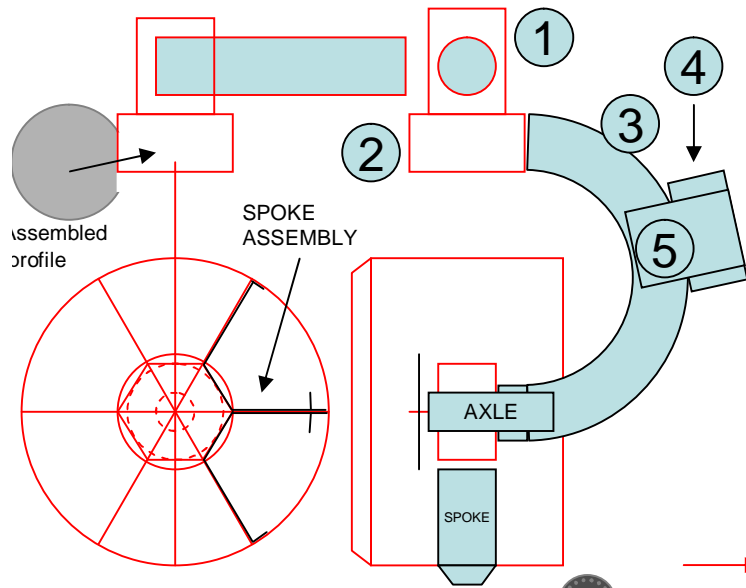
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1.65"

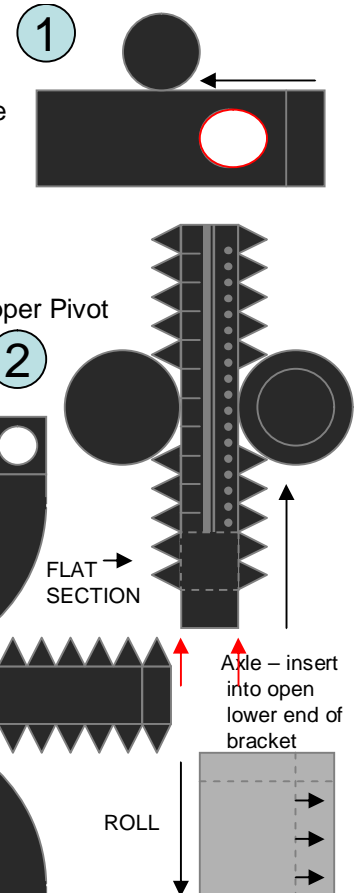
ROLL



Mars Science Laboratory – Suspension 4 steering “corner” bogies

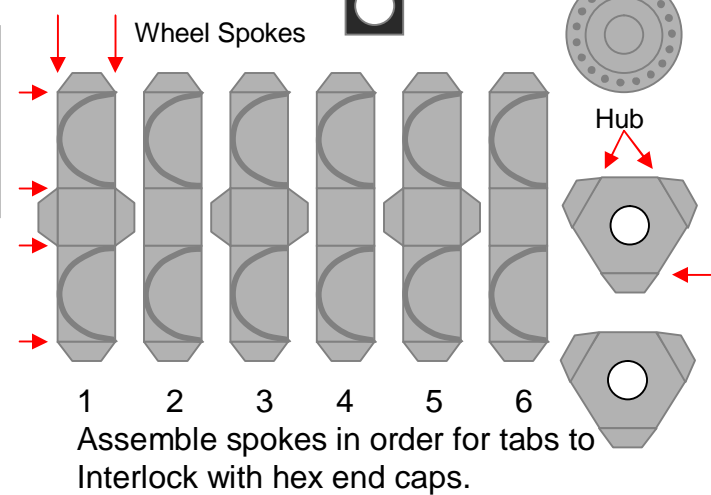
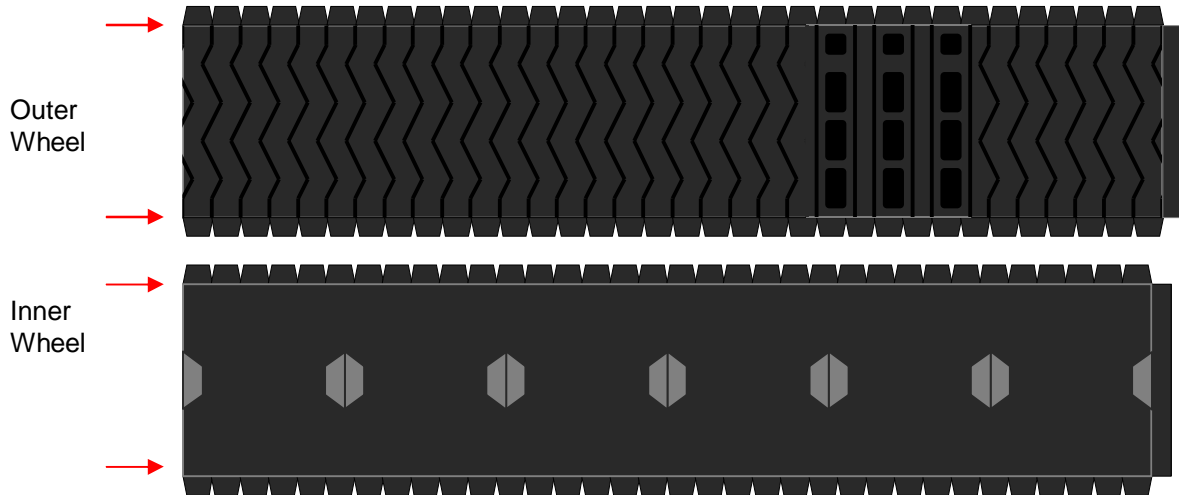


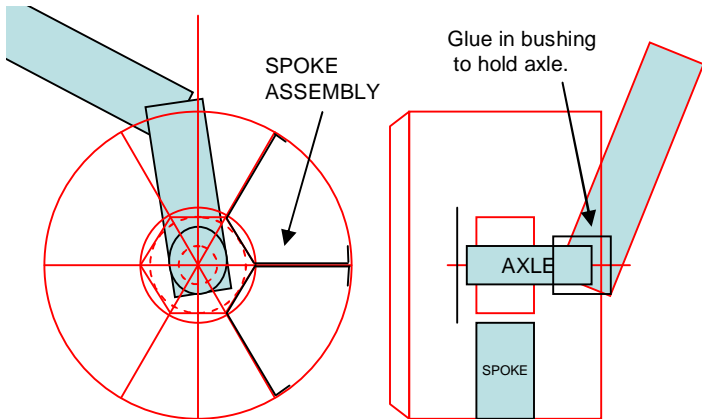
Roll outer wheel into a cylinder and glue.
 Roll inner wheel to fit inside (trim if needed) and glue (no glue on edge tabs!).
 Fold spokes and glue spoke faces to form a hexagonal hub. Fold tabs on assembly and hexagonal end caps down and glue to lock hub.
 Slip hub inside wheel and secure using small tabs on spoke ends.
 Bend edge tabs on wheel inward (glue between layers) to form wheel rim.
 Curve, fold and glue part 3.
 Roll and glue upper pivot parts 1 & 2, refer to suspension page to align suspension attachment hole (1) and bracket attachment flat section on part 2. Attach bracket to pivot cylinder using light gray square to align.
 Roll axle and glue to round hub face.
 Slip axle thru hub and secure to bracket.
 Attach to suspension using hole in part 1.



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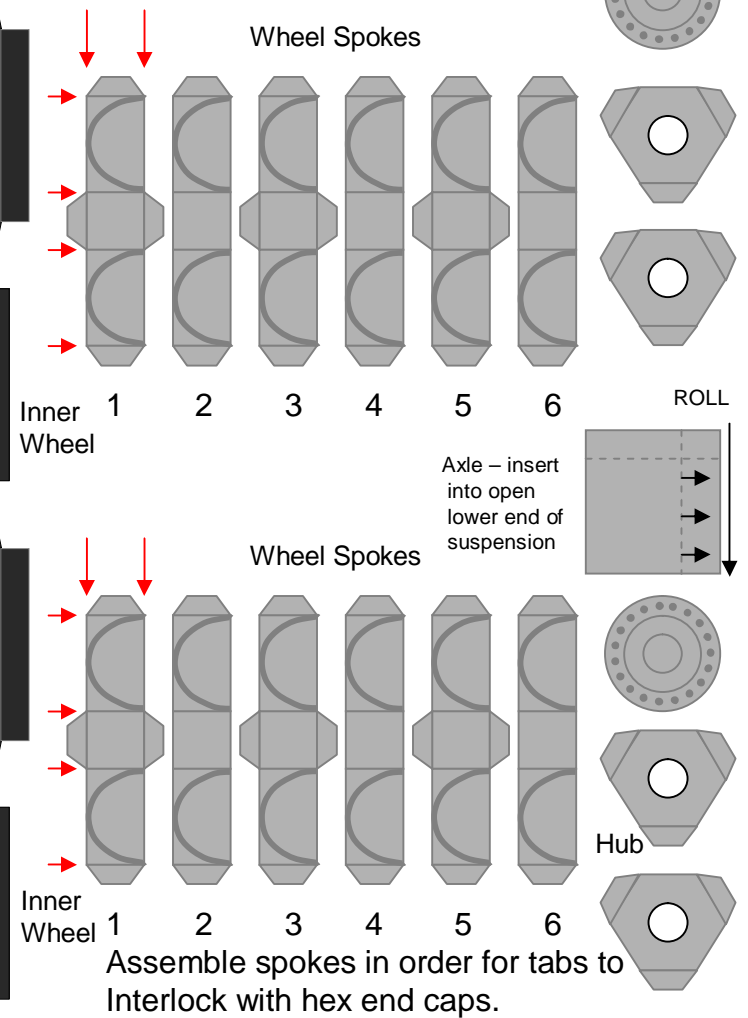
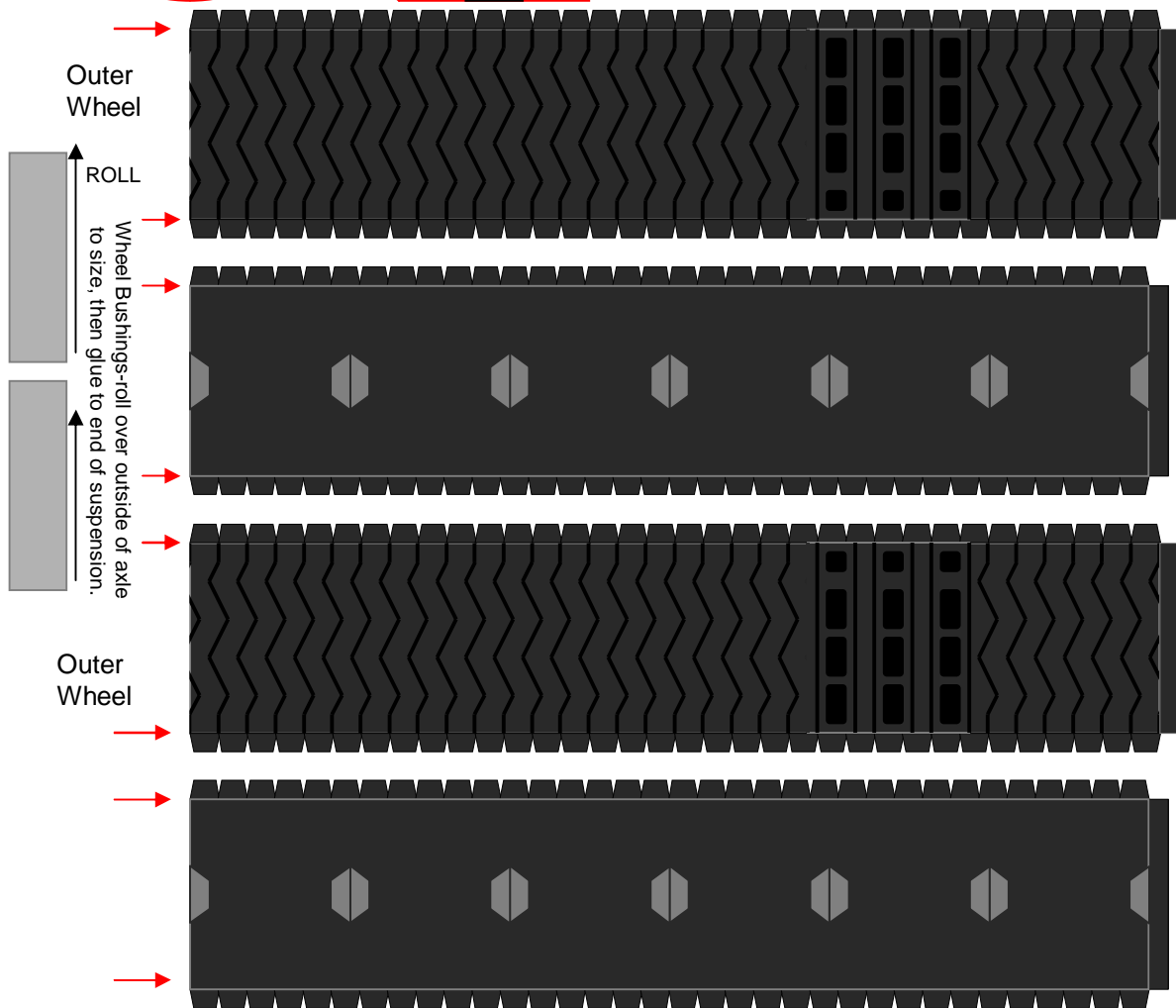
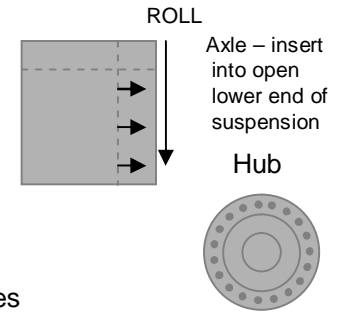




Mars Science Laboratory – Suspension 2 fixed center wheels

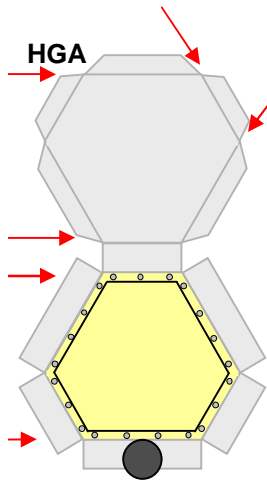
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Roll outer wheel into a cylinder and glue. Roll inner wheel to fit inside (trim if needed) and glue. Bend edge tabs on wheel inward to form rim. Fold spokes and glue spoke faces to form a hexagonal hub. Attach hexagonal end caps using interlocking tabs. Slip hub inside wheel and secure using small tabs on spoke ends. Attach one corner bogie to the aft suspension section, trim suspension part 3 and insert axle, making sure it lines up with the corner bogie axle. Slip wheel assembly onto axle and secure with round hub face.



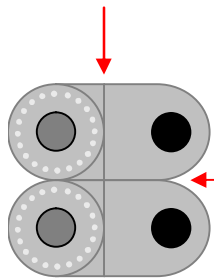
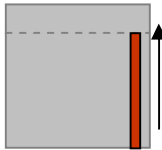
Mars Science Laboratory Chassis

Fold chassis box, insert inner reinforcement grid, glue on rear corners, then attach bottom



Center on bottom, front

Axle & motor overlay

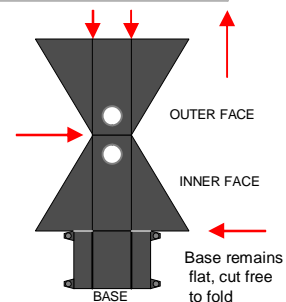
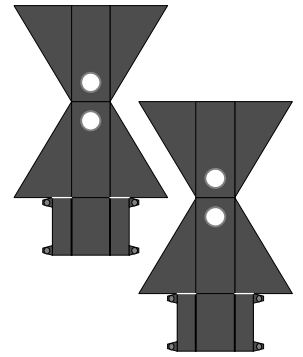
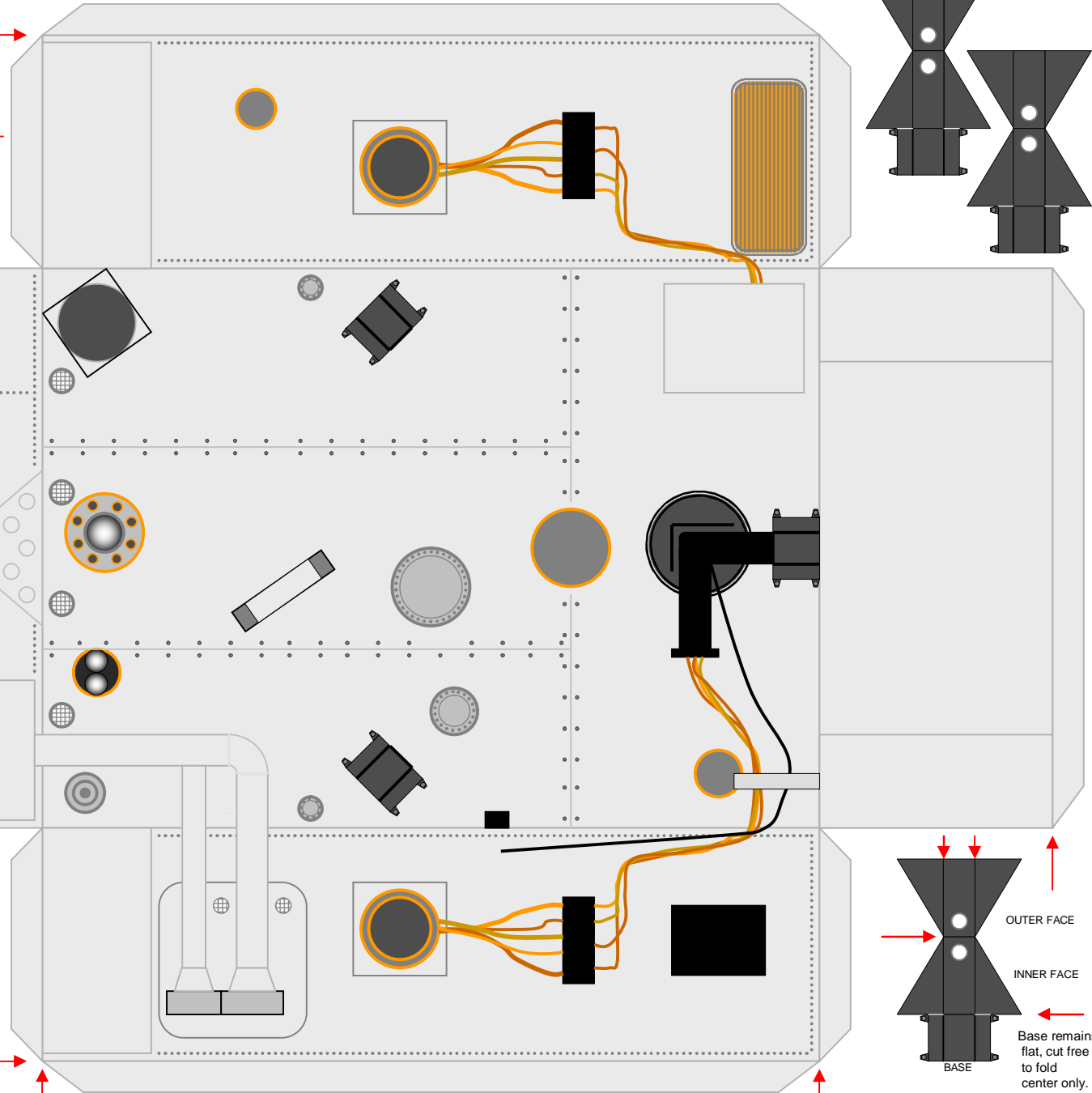
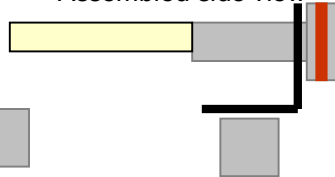


Bracket

Assembled side view

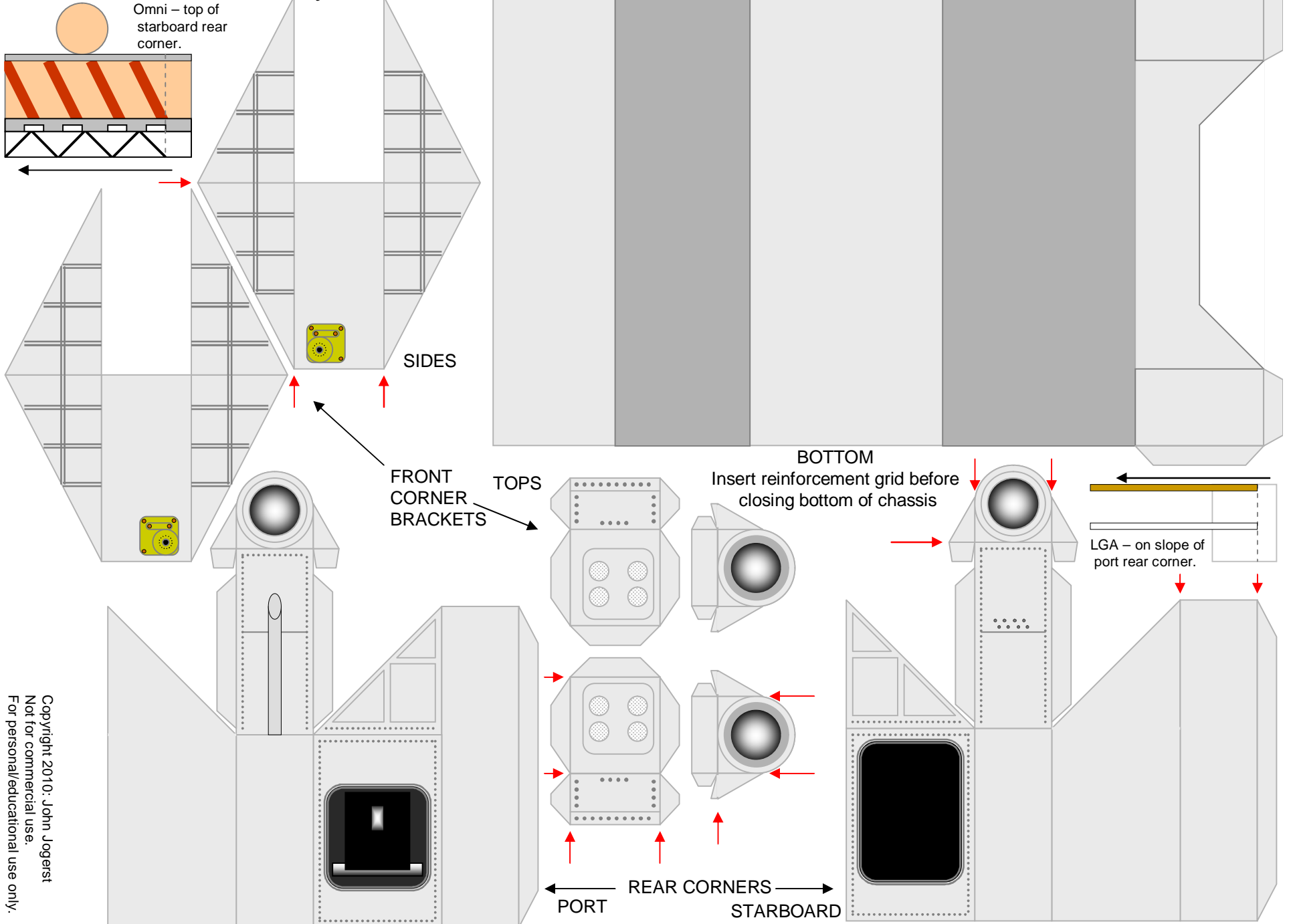


Base



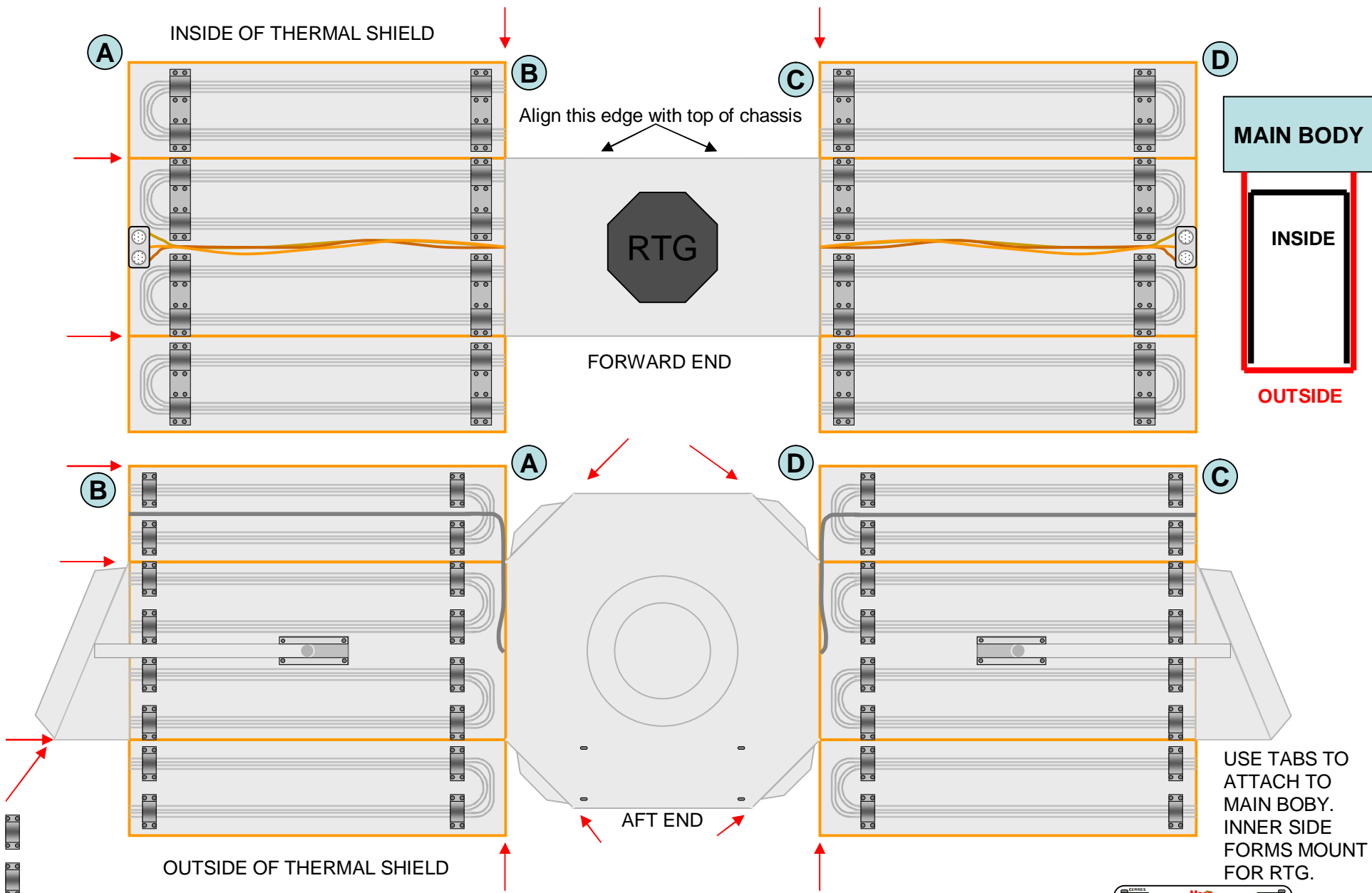
Skyhook attachment

Mars Science Laboratory – Chassis



Eat my dust, SPIRIT !!

Mars Science Laboratory – RTG thermal shield

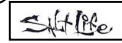


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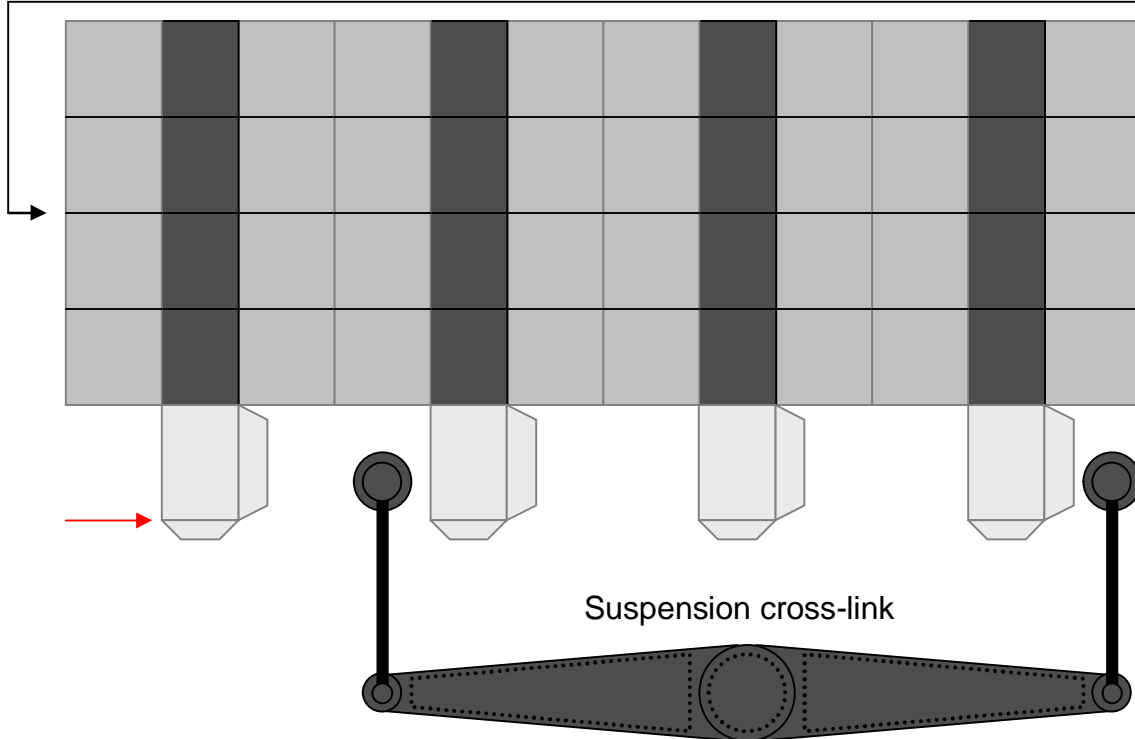
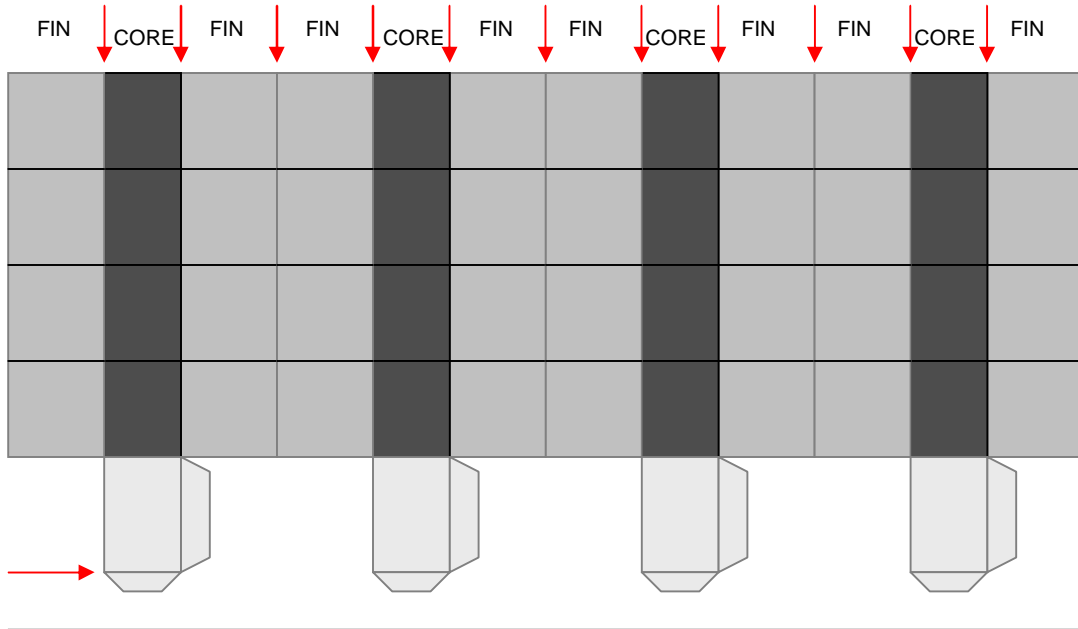
Fold outer shield and secure using small tabs on aft end. Fold inner shield into shape. Glue RTG in place to inner shield, then slip inner shield into outer and glue together. Attach to chassis between rear corner parts using angled tabs.



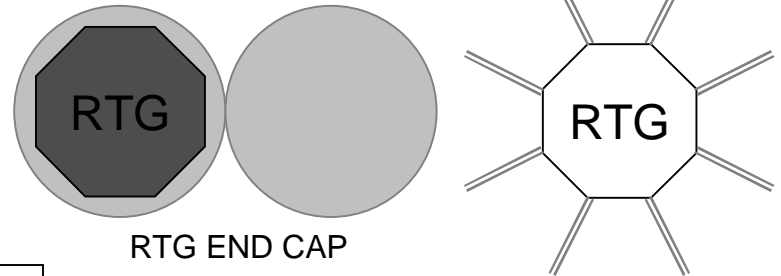
We brake for Aliens



RTG BODY

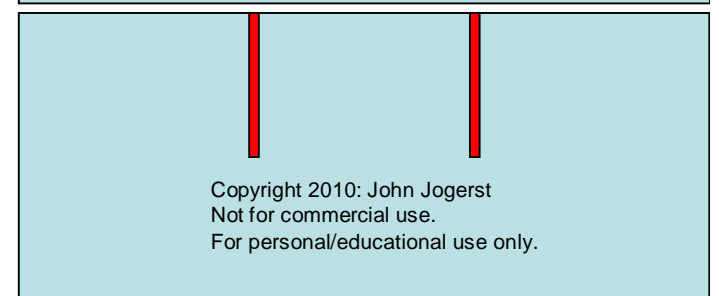
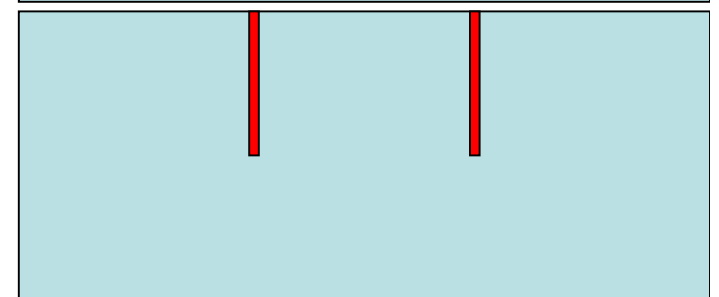
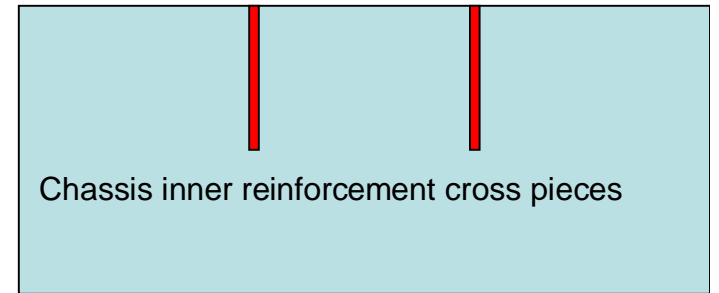
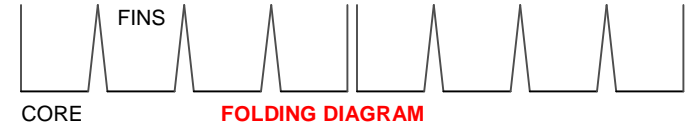


Mars Science Laboratory - RTG core

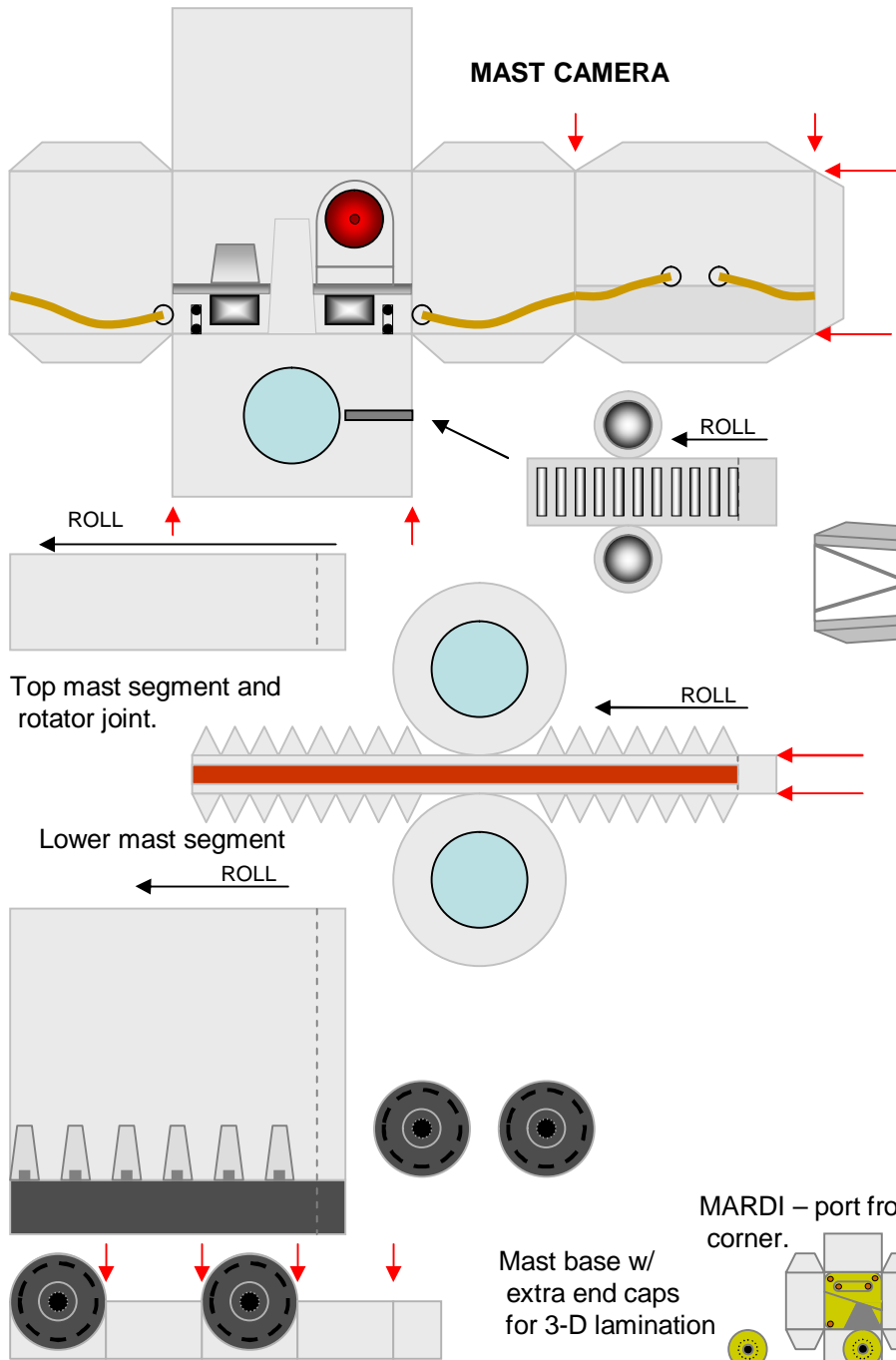


RTG END CAP

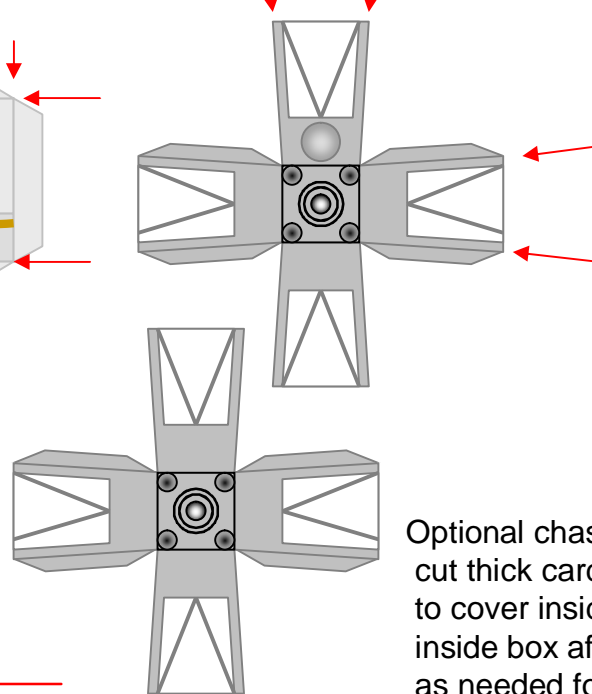
Fold RTG body, forming the fins first. Fold core into an octagon and secure using fins and tabs at base.



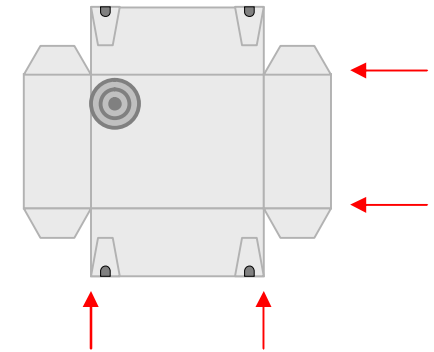
Mars Science Laboratory - instruments



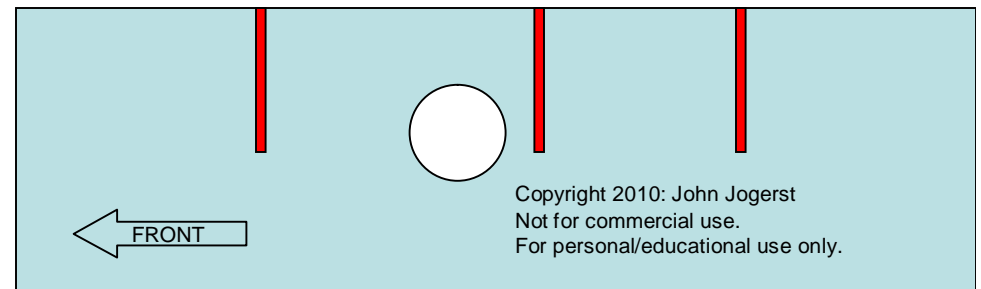
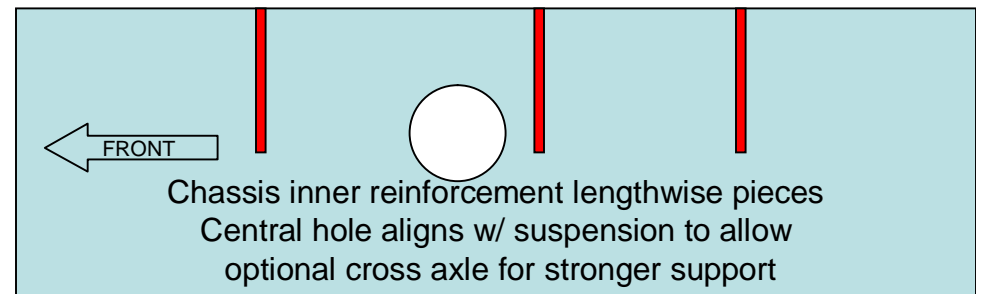
Drill bit boxes - front starboard of chassis



Electronics box - aft starboard on top of chassis

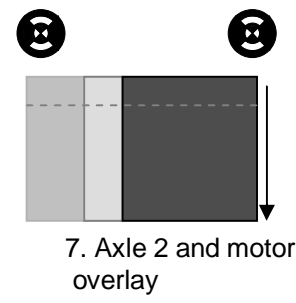
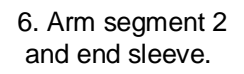
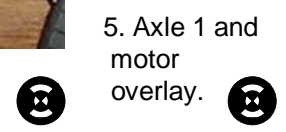
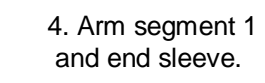
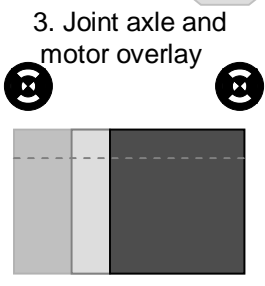
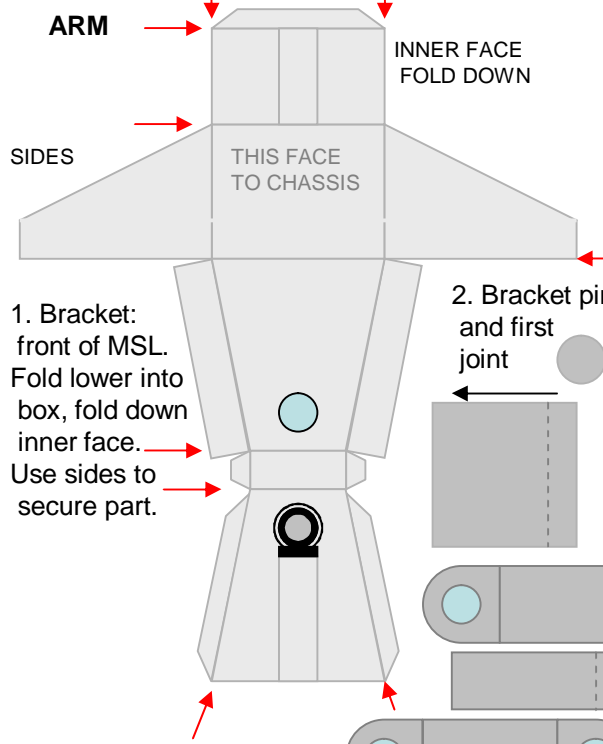


Optional chassis box reinforcement: cut thick card panels to cover inside of top, sides and front. Laminate inside box after folding; trim inner reinforcement as needed for clearance; then secure bottom.

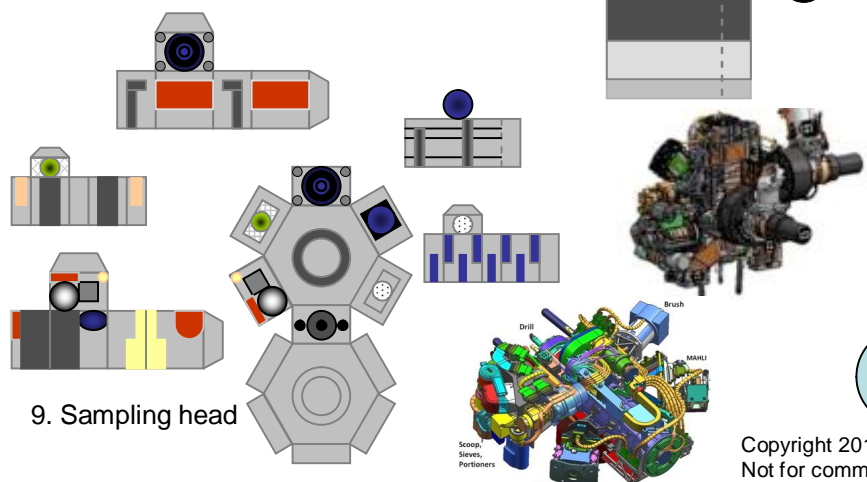


Mars Science Laboratory - instruments

Organic check blocks mount on chassis

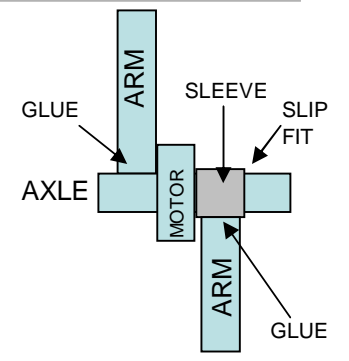


8. Sampling head joint and axle w/ motor overlay



For more accurate motor disks at arm joints cut long strips of card .2"/5mm wide and wrap axle to desired diameter or laminate 1/2 inch disks to thickness needed.

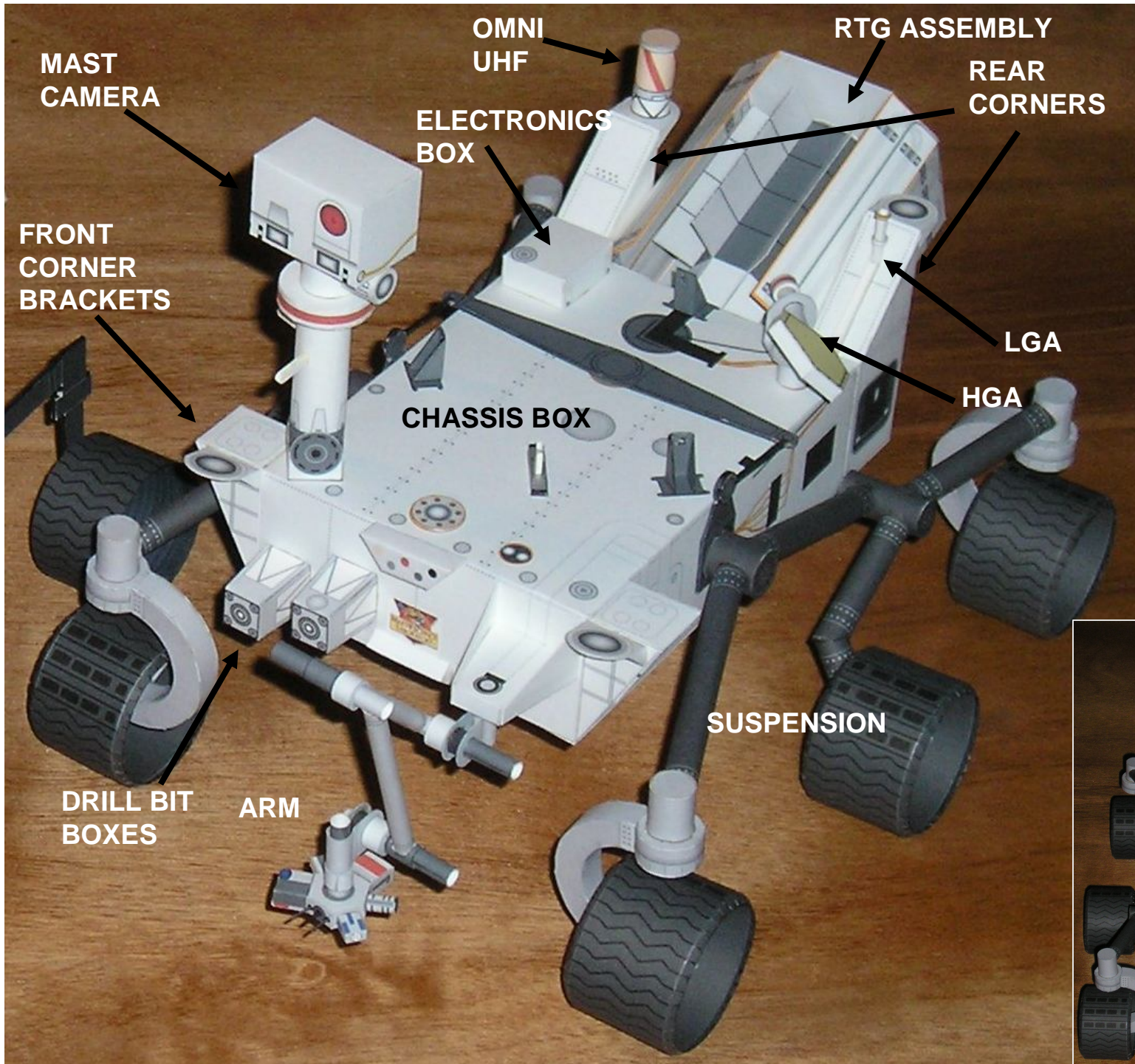
Glue a sleeve inside each of the end fittings – axles go thru the "ear" holes, pin and sampling head slip into sleeve



2.4"

BRACKET

To form sleeve parts: roll sleeve over the outside of a completed axle taking care not to glue the two parts to each other.



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