ESTES

A SUBSIDIARY OF DAMON

Challenger-1

Flying Model Rocketry Starter Kit

Read the assembly instruction sections of this manual carefully before beginning to put together your CHALLENGER-1 model rocket starter outfit. Even better, read this entire manual first so you will best understand the operation of each system.

Make sure you have all parts and materials before you start construction. As you assemble your rocket and launch equipment, follow the instructions in exact order. Check off each step as you complete it.

If you have not assembled electrical or electronic kits before, have a friend or relative who has done electronic kit assembly help you with the Launch System.

ESTES INDUSTRIES
PENROSE, COLO. 81240

Welcome to the exciting world of model rocketry. Your Challenger-1 starter outfit is designed to give you many enjoyable launchings and to provide you with necessary basic equipment as you build other kits and advance to launching designs of your own. This manual was prepared both to help you get perfect flights from your first model and to give you extra information you'll need as you go on to build other advanced model rockets.

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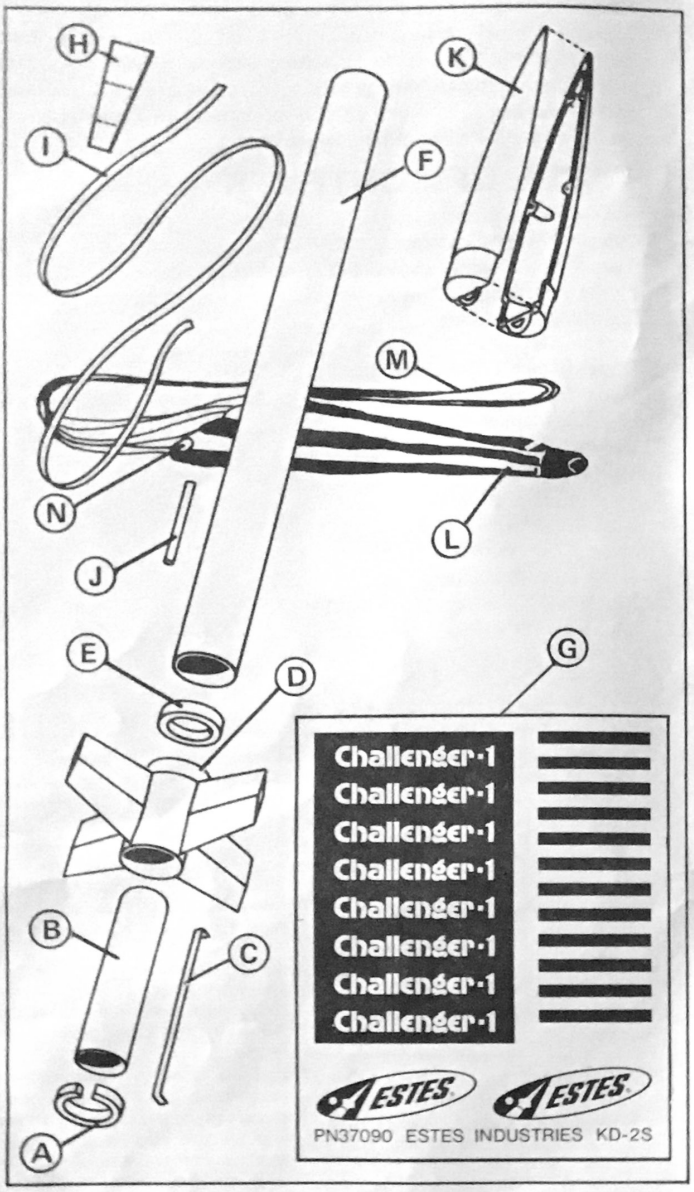
MODEL ROCKETRY SAFETY CODE

1. **Construction** – My model rockets will be made of lightweight materials such as paper, wood, plastic and rubber, without any metal as structural parts.
2. **Engines** – I will use only preloaded factory made model rocket engines in the manner recommended by the manufacturer. I will not change in any way nor attempt to reload these engines.
3. **Recovery** – I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again.
4. **Weight Limits** – My model rocket will weigh no more than 453 grams (16 ozs.) at liftoff, and the engines will contain no more than 113 grams (4 ozs.) of propellant.
5. **Stability** – I will check the stability of my model rockets before their first flight, except when launching models of already proven stability.
6. **Launching System** – The system I use to launch my model rockets must be remotely controlled and electrically operated, and will contain a switch that will return to "off" when released. I will remain at least 10 feet away from any rocket that is being launched.
7. **Launch Safety** – I will not let anyone approach a model rocket on a launcher until I have made sure that either the safety interlock key has been removed or the battery has been disconnected from my launcher.
8. **Flying Conditions** – I will not launch my model rocket in high winds, near buildings, power lines, tall trees, low flying aircraft, or under any conditions which might be dangerous to people or property.
9. **Launch Area** – My model rockets will always be launched from a cleared area, free of any easy to burn materials, and I will only use non-flammable recovery wadding in my rockets.
10. **Jet Deflector** – My launcher will have a jet deflector device to prevent the engine exhaust from hitting the ground directly.
11. **Launch Rod** – To prevent accidental eye injury I will always place the launcher so the end of the rod is above eye level or cap the end of the rod with my hand when approaching it. I will never place my head or body over the launching rod. When my launcher is not in use I will always store it so that the launch rod is not in an upright position.
12. **Power Lines** – I will never attempt to recover my rocket from a power line or other dangerous places.
13. **Launch Targets & Angle** – I will not launch rockets so their flight path will carry them against targets on the ground, and will never use an explosive warhead nor a payload that is intended to be flammable. My launching device will always be pointed within 30 degrees of vertical.
14. **Pre-Launch Test** – When conducting research activities with unproven designs or methods, I will, when possible, determine their reliability through pre-launch tests. I will conduct launchings of unproven designs in complete isolation from persons not participating in the actual launching.

This Solid Propellant Model Rocketry Safety Code is Approved by The National Association of Rocketry and the Hobby Industry Association of America.

ROCKET ASSEMBLY



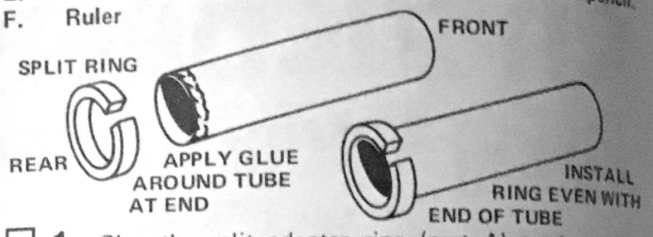
Locate the parts and materials listed below in your kit and lay them out on the table in front of you. (All rocket parts except the decal and plastic fin and nose cone are packed in one plastic bag.)

PARTS LIST

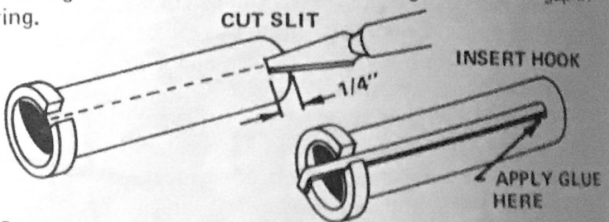
A)	1	Split Adapter Ring (type AR-2050S)	80425
B)	1	Engine Mount Tube (type BT-20J) 2-3/4 inches long	30326
C)	1	Engine Hook (type EH-2)	35025
D)	1	Plastic Fin Unit (type PRP-1G)	32486
E)	1	Adapter Ring (type AR-2050)	30164
F)	1	Body Tube (type WBT-50W) 9-1/2 inches long	30373
G)	1	"Water Transfer" Decal Sheet (type KD-2S)	37090
H)	1	Shock Cord Mount (type SCM-50)	84444
I)	1	Shock Cord (type SC-1) 18 inch elastic strip	85730
J)	1	Launch Lug (type LL-2B) 2-3/8 inch long	38178
K)	2	Nose Cone Halves (type PRP-1H)	32487
L)	1	Parachute (type PK-12A)	85564
M)	1	72" Shroud Line Cord (type SLT-72)	38237
N)	6	Tape Discs (type TD-3F)	38406

You will need a few tools and supplies, so collect them before you start. Here's the list:

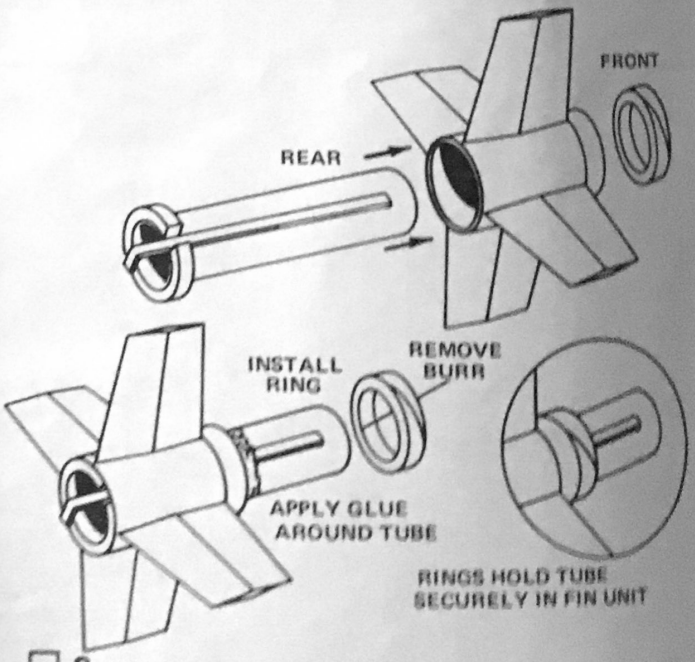
A. White Glue: Estes Rocket Glue, Elmer's, or similar.
B. Plastic Model Cement: Use cement made for styrene models.
C. Scissors: Almost anything that will cut paper is fine.
D. Knife: A sharp model knife or a single-edge razor blade.
E. Pencil: A ball point pen will do if you can't find a pencil.
F. Ruler



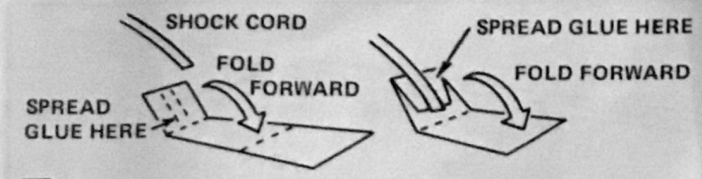
☐ **1** Glue the split adapter ring (part A) to the engine mount tube (part B). Apply a line of white glue around the outside of the engine mount tube at one end. Position the split ring over the glue so the end of the ring is even with the end of the tube and press the ring snugly around the tube. Wipe away any extra glue. Be sure to clean the extra glue from the gap in the ring.



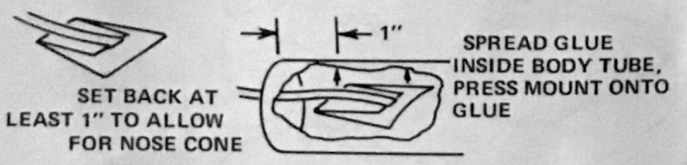
☐ **2** Mark the engine mount tube 1/4 inch from the end opposite the ring and on a straight line from the gap in the split ring. Use a sharp knife to cut a 1/8 inch long slit in the tube at the mark as shown. Make sure the slit is in line with the gap. Push one end of the engine hook (part C) into the slit and position the hook so it runs through the gap in the ring. Apply a drop of white glue to seal the front of the hook in the slit.



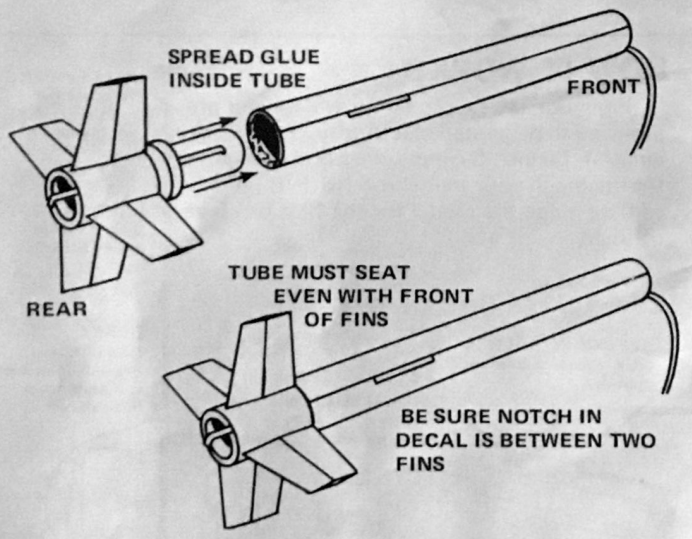
☐ **3** Slide the assembly from step 2 into the fin unit (part D) from the rear. The split adapter ring should fit completely into the fin unit. Apply a line of white glue around the engine mount tube 1/4 inch ahead of the front of the fin unit. Remove the "burr" from the inside of the adapter ring (part E) by mashing it flat with the side of your pencil. Slide the ring onto the engine mount tube, over the engine hook, and back tightly against the fin unit. Do not pause while installing the ring or the glue may "grab" with the ring in the wrong place.



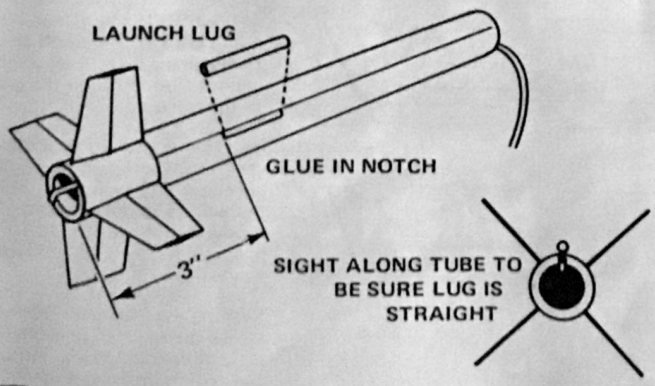
☐ **4** Cut out the shock cord mount (part H). Crease it on the dotted lines by folding. Spread white glue on the first section (1) and lay the end of the shock cord (part I) into the glue. Fold over and apply glue to the back of the first section and the exposed part of section 2. Lay the shock cord as shown and fold over again. Clamp the unit together with your fingers until the glue sets.



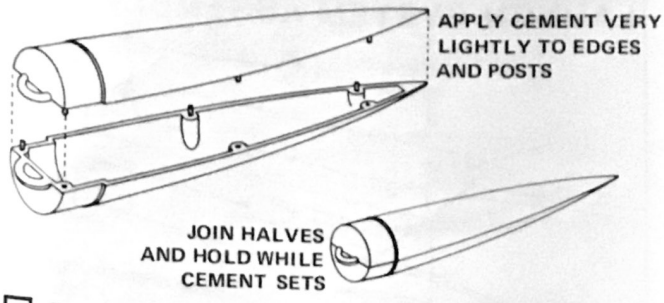
☐ **5** Apply white glue to the inside of the body tube over an area 1 inch to 2 inches from one end. The glued area should be the same size as the shock cord mount. Press the mount into the glue as shown and hold it until the glue sets.



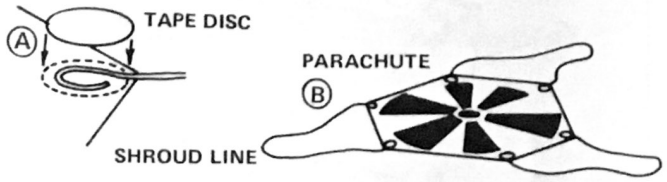
☐ **6** Spread white glue around the inside of the body tube at the end opposite the shock cord mount. The glue should cover an area extending 1/2 inch into the tube. Insert the front of the fin unit into the rear of the body tube. The tube should "seat" evenly and tightly against the shoulder on the fin unit.

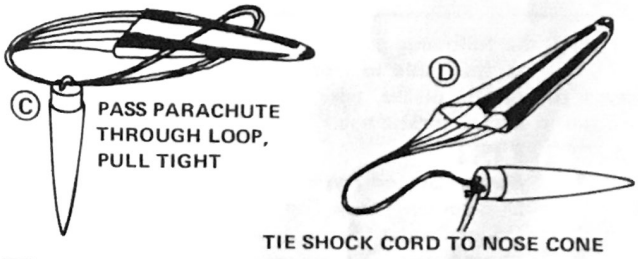


☐ **7** Glue the launch lug (part J) to the body tube between two fins, 3" ahead of the rear of the model as shown. (Use white glue.) Sight along the tube to be sure the launch lug is straight on the body.

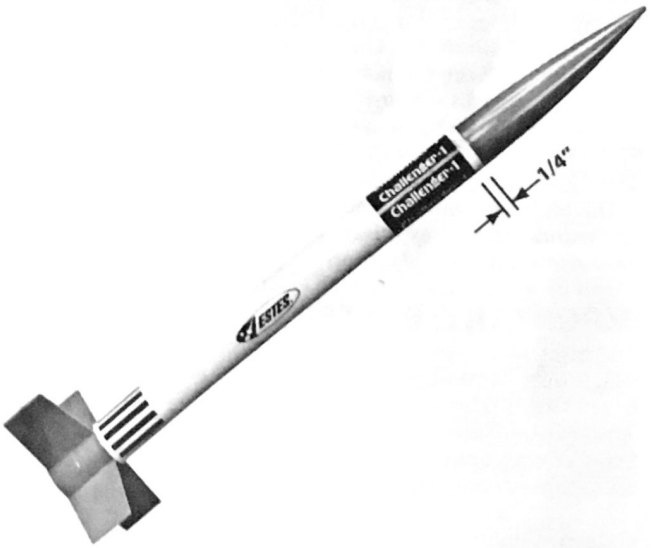


☐ **8** Glue the two nose cone halves (part K) together using plastic model cement. Be careful to not use too much or you will have a sloppy-looking joint. Make sure the alignment pins on the inside of the cone fit completely into their matching holes.





☐ **9** Cut out the parachute (part L) on its edge lines. Cut three 24 inch lengths of shroud line (part M). Attach line ends to the top of the parachute with tape discs (part N) as shown. Pass the shroud line loops through the ring at the rear of the nose cone. Pass the parachute through the loop ends and draw lines tight against the ring. Set the knot with a drop of glue. Tie the free end of the shock cord to the ring.



☐ **10** Apply decals (part G). Cut out a decal section, dip it in lukewarm water for 10 seconds, and hold it until it uncurls. Slip the decal off the backing sheet and onto the model. Blot excess water away. Apply all decals as shown in the photograph. For best results, let the model dry overnight and apply a coat of clear spray to protect the decals.