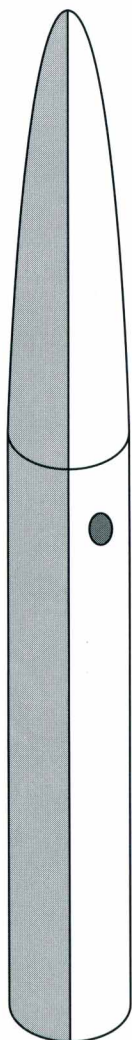
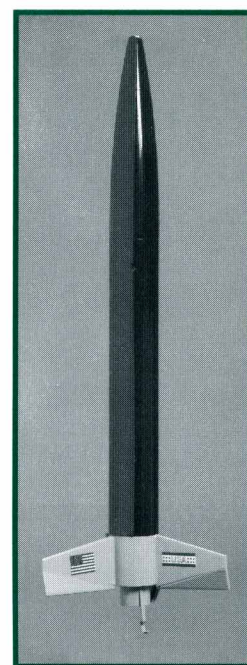


# DESIGN OF THE QUARTER WINNER

Designed by Nathan Chronister (Kingston, NY)  
Estes Rocket Plan #128

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Estes Industries, 1295 H St., Penrose, CO 81240

- **Challenging to build!**
- **FAST pre-flight prep!**
- **Extremely unique design and flight characteristics!**



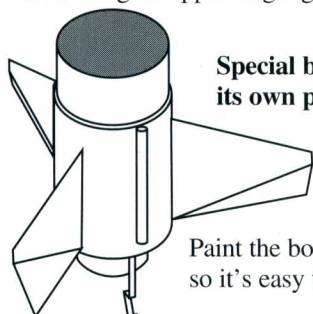
**Finless, spin stabilized upper stage allows straighter flights to higher altitudes: The usual weathervaning of multistage rockets has been overcome!**

## Amazing color change illusion!

Half of the upper stage is painted red, the other half green, as shown in the picture at right. As soon as it takes off, the rocket begins to spin at a very high rate, causing the two colors to optically mix. The rocket appears to be yellow!

**Rear ejection or, no recovery wadding needed.** The parachute is ejected by a simple piston device. The piston does not separate from the rocket so recovery and preflight are even easier than in a typical model.

**Instant stage-coupling requires no tape!**  
Uses proven nested-engine upper stage ignition.



**Special booster has its own parachute!**

Paint the booster a light color so it's easy to find.

**Suggested Engines:**  
D12-0 booster, B6-6 upper stage.

## Parts list:

Part	Prod. No.	Description	Cut to:	Qty.
A	30396	BT-60 body tube	9 3/8"	1
B	30176-5	JT-60C coupler	3/4"	1
C	30316	BT-20 body tube	8 5/8"	1
D	30128	RA-2060 ring		4
E	30162-2	EB-20A engine block		1
F	35021	Engine hook		2
G	38237	SLT-72 Shroud line	12"	3
H	71043	PNC-60AH nose cone		1
I	35820	PK-12 parachute		2
J	38265	Snap swivel		2
K	38237	SLT-72 Shroud line		2
L	30352	BT-50 body tube	2 5/8"	1
M *		Ring from 1/16" cardboard		1
N	30132	50-60 Ring Adapter		1
O	30174-5	JT-50C coupler	1/4"	1
P *	32116	BFS-40 1/8" balsa *		4
Q *	32116	BFS-40 1/8" balsa *		1
R *	32116	BFS-40 1/8" balsa *		1
S	30176-5	JT-60C coupler	1 1/8"	1
T	30396	BT-60 body tube	1 5/8"	1
U	32056	Dowel, 1/8" dia.	1/2"	2
V *		Indexcard .33"x	1 1/2"	2
W *	32116	BFS-40 1/8" balsa		3
X *	32116	BFS-40 1/8" balsa		3
Y		Toothpick (Round)	1 1/2"	6
Z	38178	LL 2B Launch lug	1 5/8"	1
AA		Tape Rings		2

\* = pattern on page 8

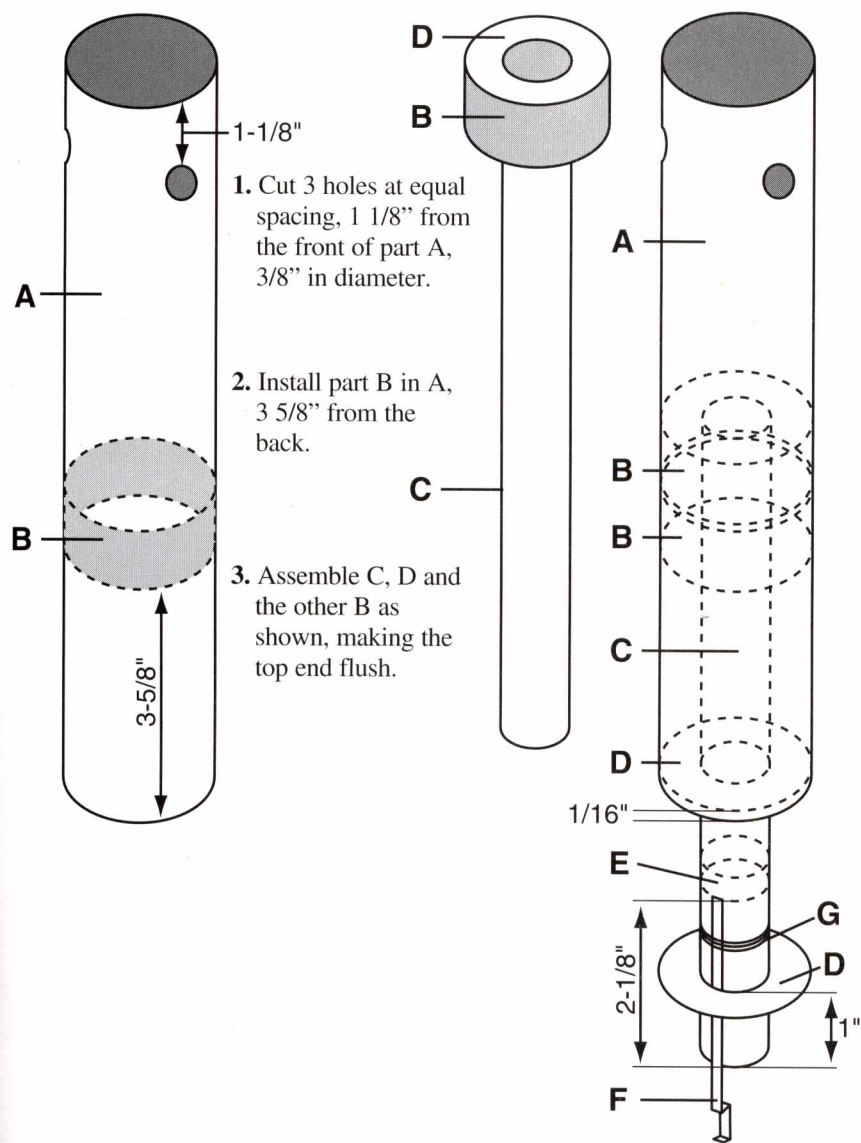
Only one sheet of BFS-40 and one 18" length of BT-60 are required.

You will need two JT-60 couplers.

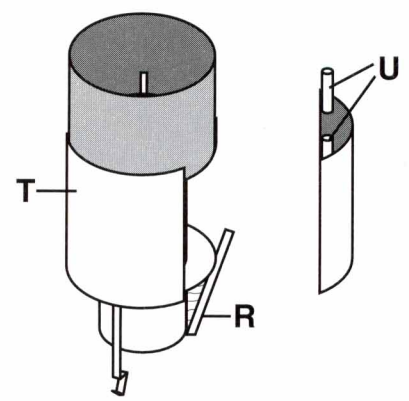
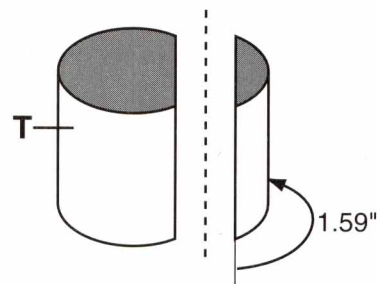
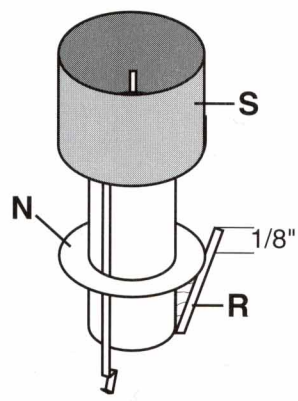
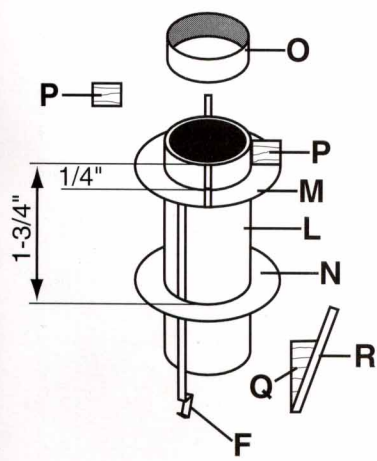
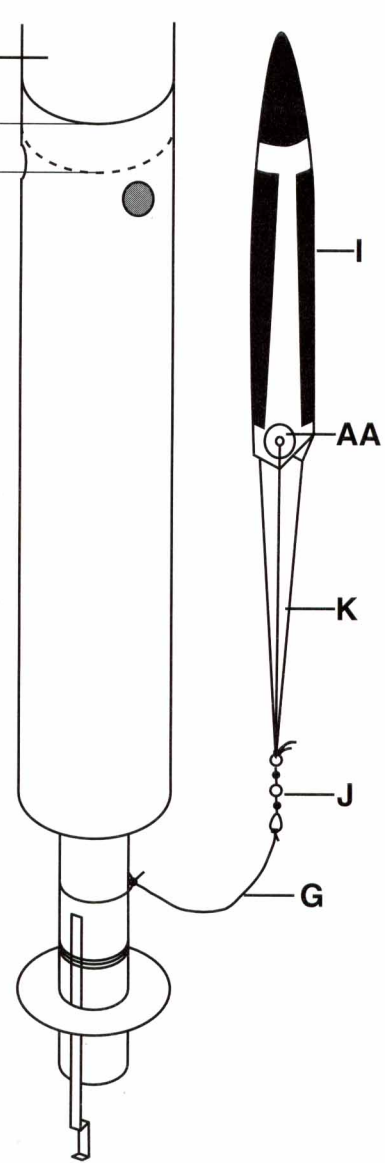
## Construction:

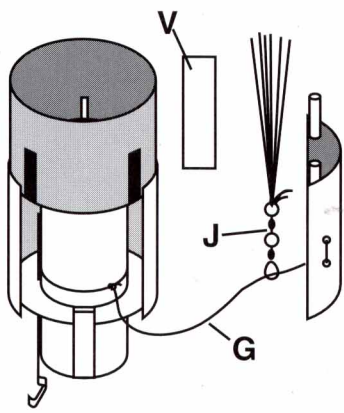
Step-by-step instructions are found on the next pages. Before beginning, cut and label all parts. Because Tao is spin-stabilized and uses a sliding parachute ejector, it must be built extra-strong. Make thick fillets but be careful to avoid runs inside the body tube as they would prevent the ejection device from sliding properly. Allow glue to dry between steps. Yellow wood glue is to be used throughout, except as otherwise stated. Because Tao has a very unconventional structure, it is important to follow instructions carefully.





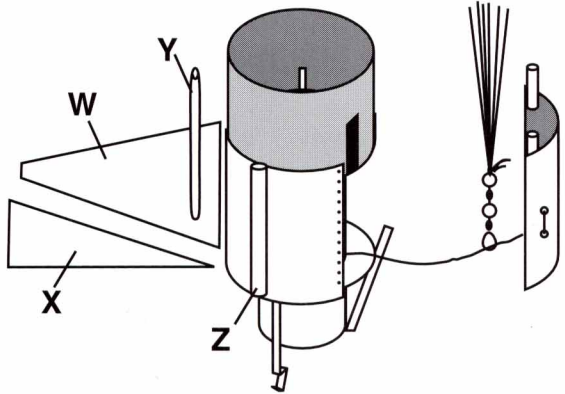
- DO NOT GLUE! Insert the free end of tube C into the front of tube A, and push it all the way down until parts B prevent further movement.
- Assemble the engine mount. Insert E using an engine casing to a depth of 2-1/8". Add part F, wrap G around the tube and coat with glue. Glue the centering rings D only to the inner tube, not the outer one! The first is placed 1/16" inside tube A, the other is 1" from the rear of tube C.
- WHEN DRY, THE C ASSEMBLY MUST SLIDE FREELY WITHIN "A". Saw H shoulder to 3/4" in length, and attach with epoxy.
- Tie a line G around tube and glue it. Make parachute (Parts I, J, K and AA). Attach J to G.



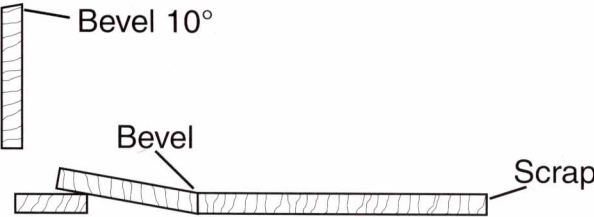


13. Mount the parachute hatch: Make two pinholes in the hatch approximately where shown. Tie one end of a line G through these holes and coat the area with glue. Tie a snap swivel J to line G where shown, and tie the other end of G tightly around tube L and glue the knot. Assemble another parachute using parts, I, K and AA. Parts V are used to cover the holes at either side of the parachute compartment.

14. Cut slots in the stage coupler: The slots allow the hatch to be seated tightly against the booster by hiding parts U inside the coupler. Use the actual hatch as a guide to cutting the slots in the correct location and size. Test the hatch to make sure it works: Pack parachute in the usual way and put it into the compartment. The hatch should refuse to stay closed. Then lock the hatch by sliding the upperstage onto the booster. It should now remain securely in place.

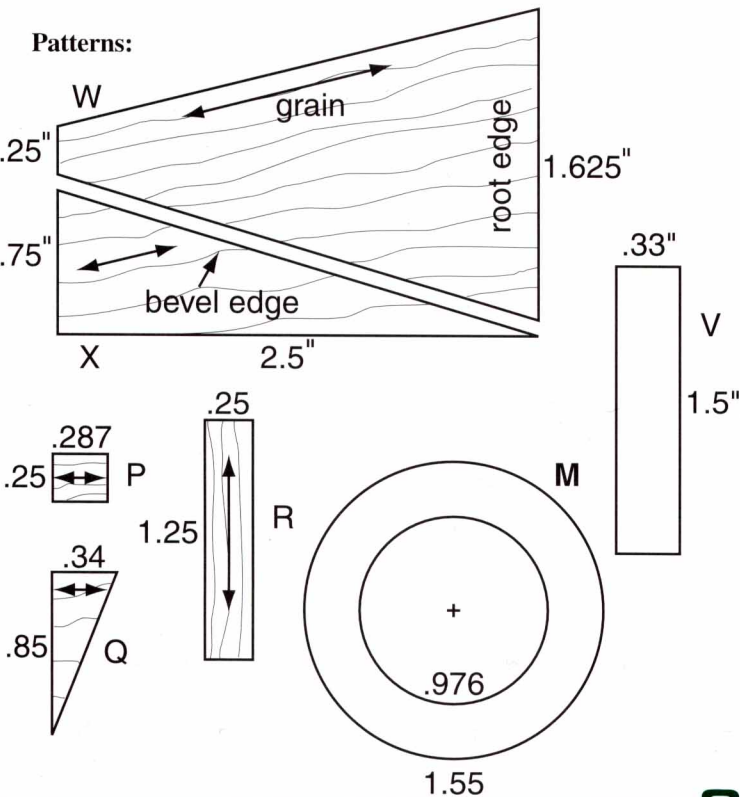


15. Assemble and mount the fins: The fins on this rocket have to make it spin, so they are a little more complicated than your basic fins. Cut the fins from the patterns below. Sand a bevel-edge onto the small fin part, at a 10 degree angle so that it will glue to the main fin part at the same angle. Glue them together, placing a scrap of balsa under the edge of the smaller part while it dries. The three fins you are making must be identical! The angles must be the same, and the small flap must go in the same direction on every fin! After the glue dries, coat the joint areas with 30 minute epoxy to strengthen them. Then sand the remaining fin edges, except for the root edge, round. All three fins are mounted to the large section of tube T. One goes in the middle, and one goes on each edge. Prepare the tube by making a row of pinholes along the joint surface and filling these with glue, to add strength, and then glue the fins on. Before adding the usual fillets, glue toothpicks along side each fin to give added resistance to side-to-side stresses.



16. Attach the launch lug where shown. Coat it with epoxy.

17. Paint as noted on first page of instructions.



**Instructions for flight:**  
 Tao is easy to prep for flight but the procedure is a bit unusual.

- 1) Pack the upper stage parachute by wrapping it around tube C in the direction opposite the rocket's rotation. If you wrap it the wrong way it will tangle or rip loose.
- 2) Push the motor mount into the main body tube, making sure the parachute doesn't get pinched.
- 3) Put a B6-6 engine into the upper stage engine mount.  
*C engines have not been used and should not be!*
- 4) Put a D12-0 engine in the booster.
- 5) Pack the booster parachute in the usual way, and put it in the hatch.
- 6) Holding the hatch shut, fit the two stages together. Note that the upper engine fits down into the casing of the booster engine, for very reliable staging.