

FLY
with

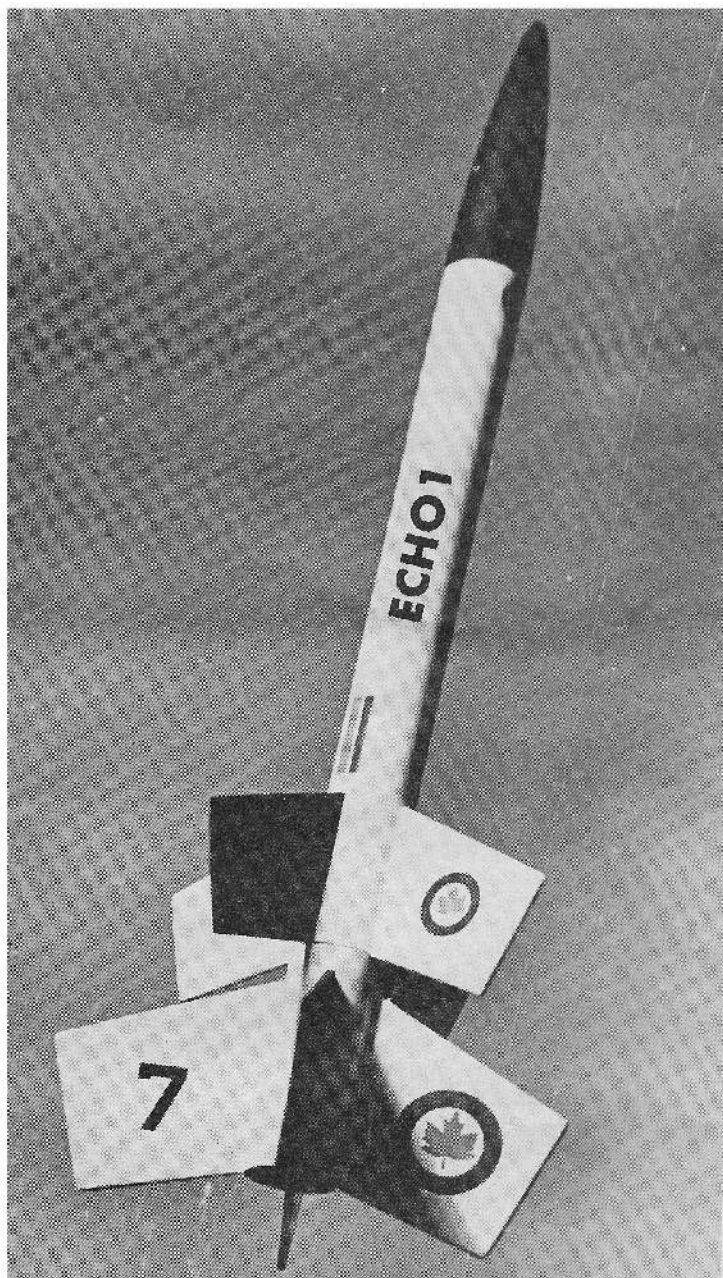
F.S.I.



ECHO 1

ROCKET

TWO STAGE



SPECIFICATIONS: Length -----20.5"
Body Dia. -----1.34"
Approx. liftoff weight
without engines --3.5 oz.

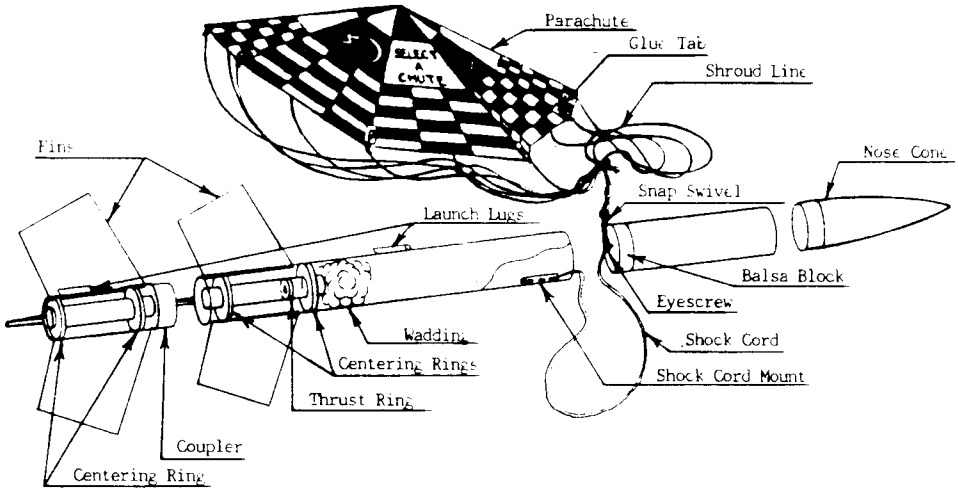
Recommended F.S.I. engines:

| 1st stage | 2nd stage |
|-----------|-----------|
| D18-0 | A4-4 |
| | C4-6 |
| | D4-6 |
| | D6-6 |

FLIGHT SYSTEMS, INC.
9300 East 68th Street
Raytown, Missouri 64133

ECHO I

Echo I offers the model rocketeer the finest two stage model rocket available today. By utilizing the superior F.S.I. DIS-6 booster engine and upper stage engine such as the DIS-6 extreme altitudes can be achieved. A tumble recovery is used on the first stage. The second stage is recovered by use of a streamer or parachute. If care is used in assembly many successful flights can be achieved. It is important that the step by step assembly instructions be followed.



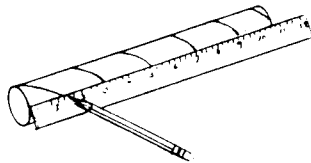
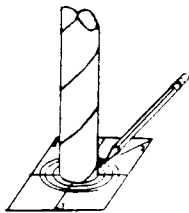
PARTS LIST:

- | | |
|---------------------------------------|---------------------------|
| 1 1.3 X 12" Body Tube | 2 Centering Rings (CR-68) |
| 1 1.3 X 3 3/4" Body Tube | 1 Thrust Ring (TR-2) |
| 1 1.3 X 4" Body Tube | 1 Eyescrew |
| 1 Nose Cone | 1 Snap Swivel |
| 8 Fins (4 small, 4 large) | 1 Shock Cord |
| 1 .903 X 3 1/4" Engine Mount Tube | 1 Shock Cord Mount |
| 1 4" X .903" Engine Mount Tube | 1 Parachute |
| 4 Centering Rings (outside dia. 1.3") | 8 Parachute Shroud Lines |
| 1 Stage Coupler | 8 Parachute Tabs |
| 1 Thrust Ring (TR-1) | 1 Decal |
| 2 Launch Lugs | 1 Flame Resistant Wadding |
| 1 18mm Engine Mount | |

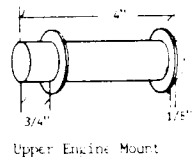
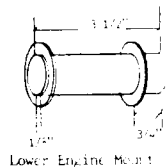
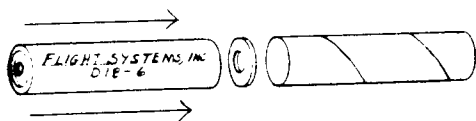
Assembly Instructions:

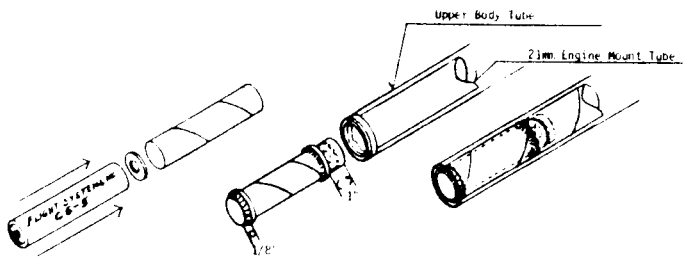
Important:

Read through entire instructions before starting assembly. Check to be sure all parts are present. Familiarize yourself with the parts and test fit the parts together before applying any glue. If a part doesn't fit properly, sand or build up for a precision fit. Please read each step before starting that step. Check off each completed step.

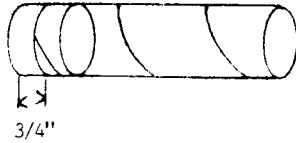


1. Using fin placement guide mark lines on the 12" X 1.3" body tube and the 3 3/4" X 1.3" body tube. Use straight edge to extend lines 3 3/4" along each tube.

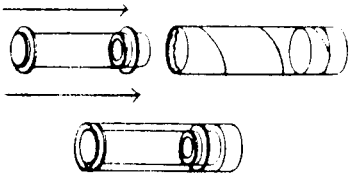




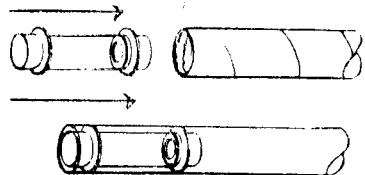
2-A If you wish to use F.S.I. 18mm engines, in the upper stage, assemble engine mount as shown above. Put a ring of glue inside 18mm engine mount tube. Using a F.S.I. 18mm engine push thrust ring into tube until engine protrudes $1/4"$. Position centering rings as shown above and glue in place as above. After dry, place a ring of glue inside upper engine mount tube and slide 18mm engine mount tube in until it is flush with the back of the body tube.



3. Run a ring of glue inside on end of the $3\ 3/4" \times 1.6"$ lower stage body tube. Push the stage coupler into the glued end until it protrudes $3/4"$ out of the tube. Now slide the $12" \times 1.3"$ upper body over the stage coupler (DO NOT GLUE). Roll tubes on flat surface to insure proper stage coupler alignment. Separate tubes and allow stage coupler to dry in place.

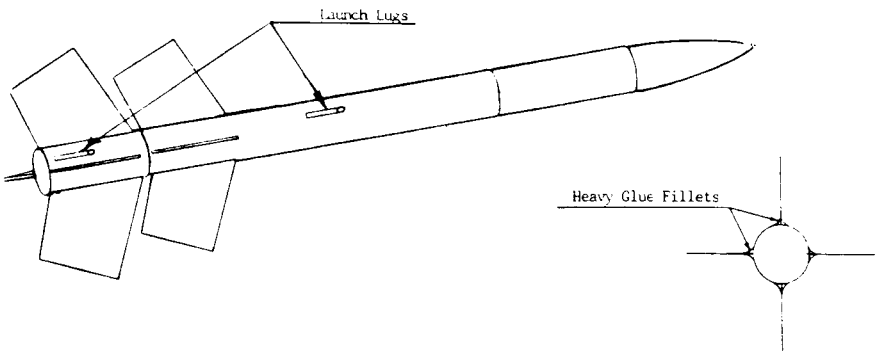


Lower Engine Mount

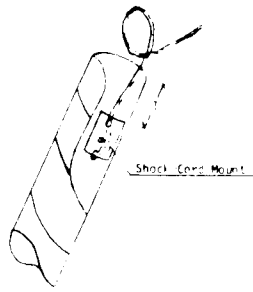
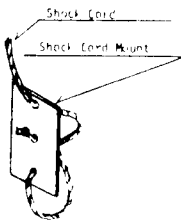


Upper Engine Mount

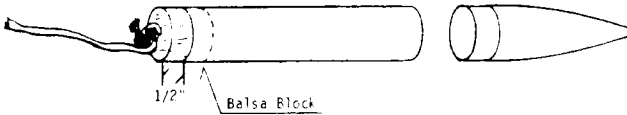
4. Run a ring of glue in end opposite stage coupler of lower stage body tube. Slide lower engine mount assembly from step 2 into lower stage body tube until upper centering ring comes in contact with bottom of coupler. Now run a ring of glue in end of $12" \times 1.3"$ upper stage body tube that has previously been marked for fin alignment. Slide upper stage engine mount assembly from step 2 into upper stage body tube until rear of engine mount tube is flush with back of body tube. Note: when installing both upper and lower engine mounts be sure to push them in with a smooth motion. This will prevent mount from sticking in tube prematurely.



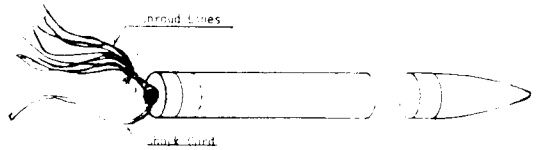
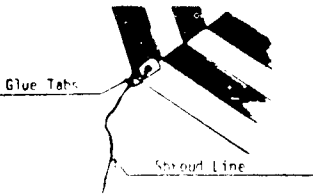
5. Lightly sand and round the edges of all fins. DO NOT sand root (red edge) of the fins. Slide upper and lower stage body tube together. Align upper and lower fin alignment marks. Attach the red edge of the fins to the body tube. Be sure the fins stick straight out from the body tube and are carefully aligned with the alignment marks on the body tube. It is best to put both fins of same line on one after the other so you can align upper and lower stage fins with one another. Apply a line of glue to the launch lug and place it centered between 2 fins of lower stage. It should also be parallel to body tube. Stand the assembly on its forward end and allow to dry. Extend a parallel line from the launch lug to a point $11"$ up the upper body tube. Glue the upper launch lug to the tube at this point. Be sure upper lug aligns with lower lug. Run 2 or 3 heavy glue fillets on both sides of the fins for added strength.



6. Install shock cord in shock cord mount as shown. Spread a heavy layer of glue over the side opposite the shock cord knot. Curve shock cord mount and insert into the nose cone end of the body tube and firmly press in place. Drawing shows the proper position in the body tube.



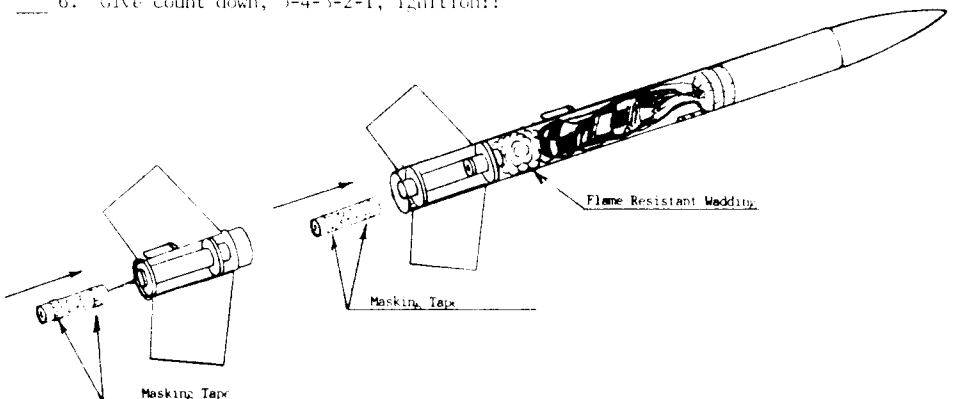
7. Glue balsa bulkhead into one end of 4" X 1.3" payload section. Slide nose cone into other end. Friction Fit nose with masking tape to insure a snug fit. Twist eyescrew into center rear of balsa bulkhead and tie shock cord through eye.



8. The parachute is marked in inches. Cut with scissors to the desired size. For the Echo cut 14". Lay the parachute on a flat surface and attach shroud lines as shown. Punch a hole through the glue tab and tie the shroud lines to the parachute. Attach snap swivel.
9. The rocket is now ready to paint and add decals. It is recommended that a light coat of paint be sprayed on and let dry. Add a couple more mist coats lightly sanding between them. Then apply a wet coat (gloss just appears) and set aside to dry. After model is completely dry apply decals. Cut one decal at a time from the sheet and submerge in lukewarm water until decal will slide off of the paper (usually about 20 seconds). Gently slide decal onto rocket and carefully smooth out any wrinkles.

FLIGHT PREPARATION

1. Install flameproof wadding as shown in cutaway view of rocket.
2. Fold and install parachute. It is a good idea to dust parachute with ordinary talcum powder before each flight.
3. Install engines using Friction Fit. Several wraps of masking tape are placed around each engine as shown to hold them in place. Push engines until they come in contact with thrust rings. About 10 lbs. of force should be required to insert engines. Be sure to use 0 delay engine in lower stage.
4. Place the rocket on the launcher insert the F.S.I. ignitor and attach the firing clips as shown.
5. Go back to launch control and clear the area. Arm the launch control by inserting the phone jack attached to the firing line.
6. Give count down, 5-4-3-2-1, ignition!!



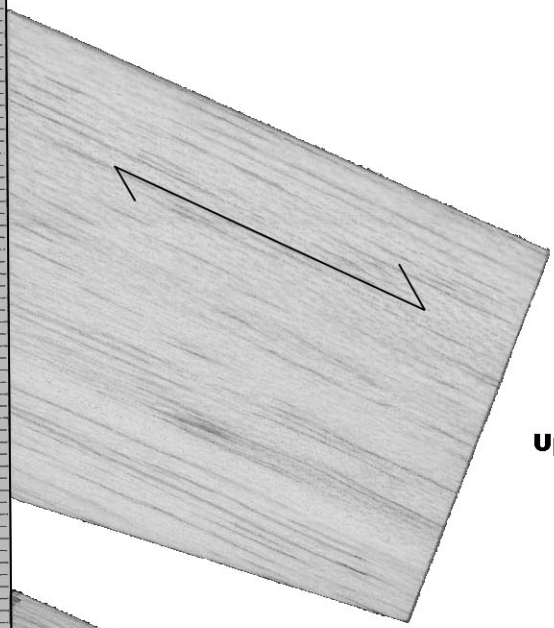
Be sure to follow the FHIA-NAR Model Rocket Safety Code when carrying out your Model Rocket Activities.

FHIA- Hobby Industry of America

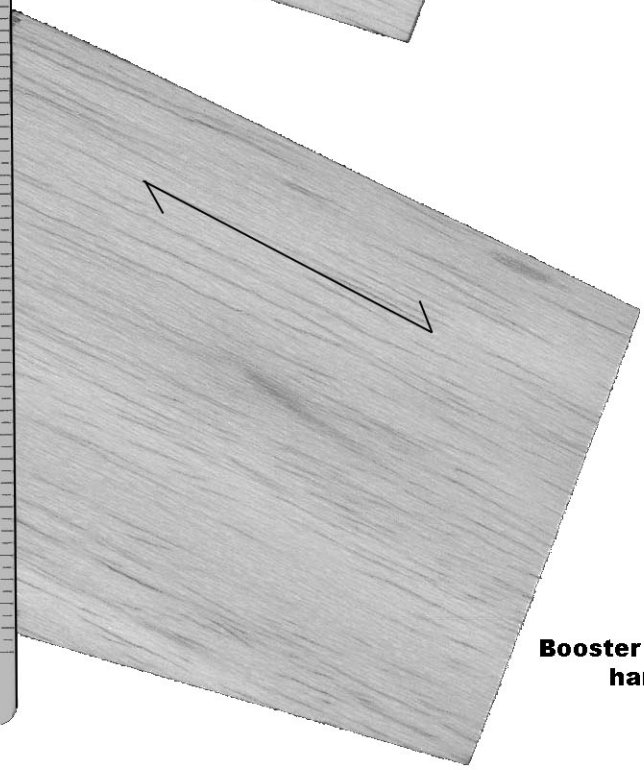
NAR- National Association of Rocketry



FSI MRK-15 Echo 1 Fin Templates



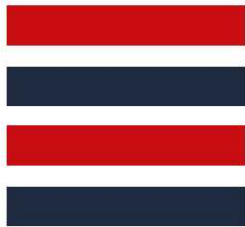
Upper Stage Fins: 4 x 3/32" hard balsa



Booster Fins: 4 x 1/8" hard balsa

ECHO 1

7



FLIGHT SYSTEMS

