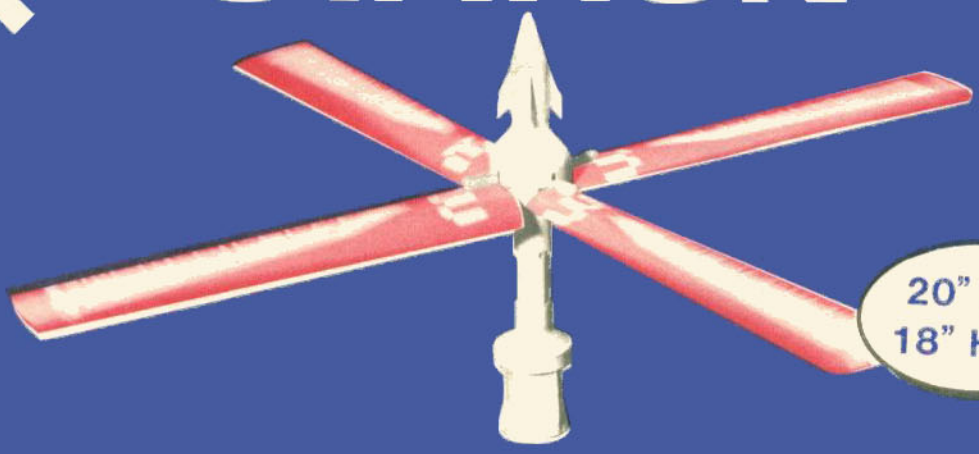
ROTATING SPACE STATION

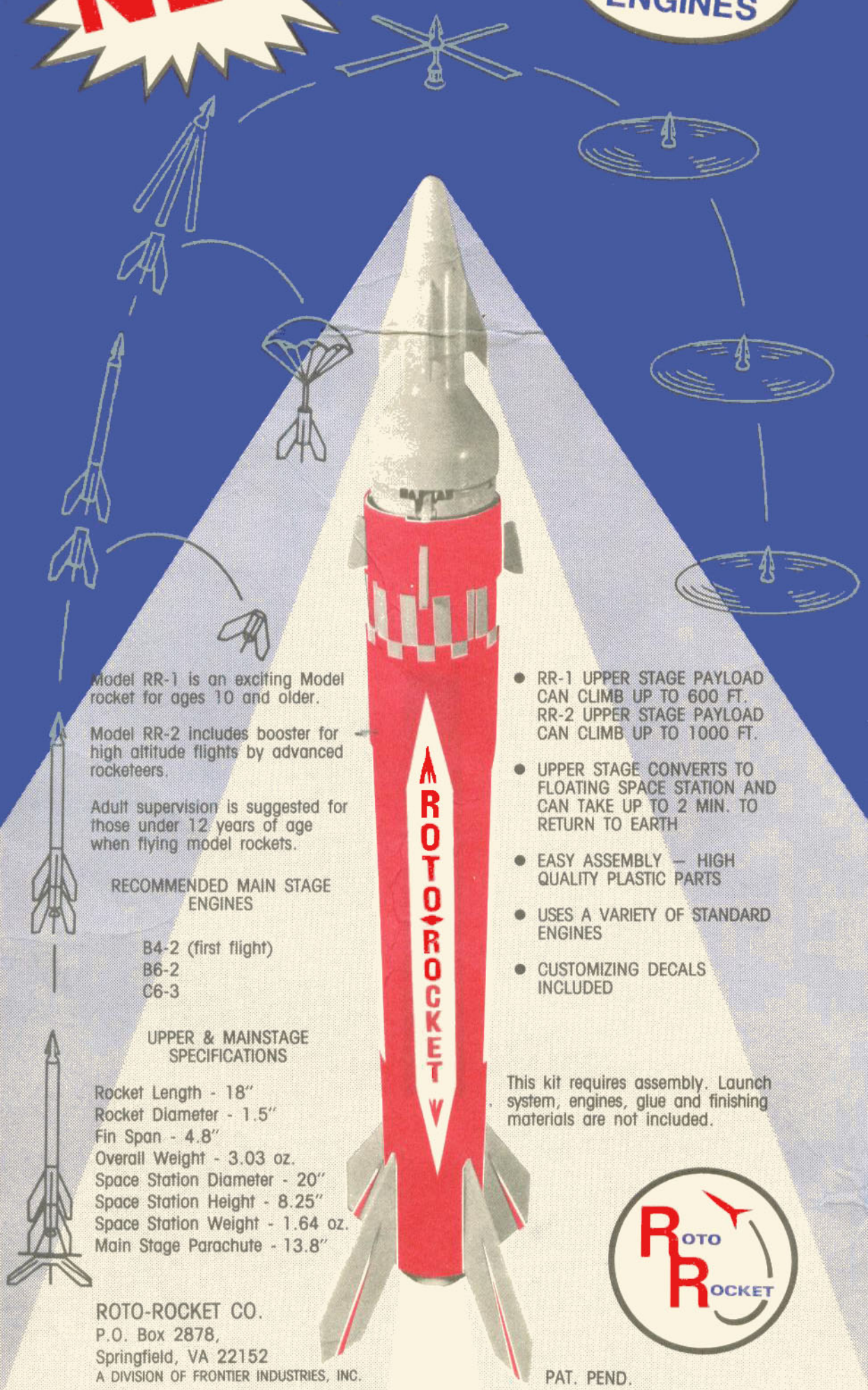


20" DIA.
18" HIGH

SLOWLY DESCENDS TO EARTH

NEW

USES STANDARD ENGINES



Model RR-1 is an exciting Model rocket for ages 10 and older.

Model RR-2 includes booster for high altitude flights by advanced rocketeers.

Adult supervision is suggested for those under 12 years of age when flying model rockets.

RECOMMENDED MAIN STAGE ENGINES

B4-2 (first flight)
B6-2
C6-3

UPPER & MAINSTAGE SPECIFICATIONS

Rocket Length - 18"
Rocket Diameter - 1.5"
Fin Span - 4.8"
Overall Weight - 3.03 oz.
Space Station Diameter - 20"
Space Station Height - 8.25"
Space Station Weight - 1.64 oz.
Main Stage Parachute - 13.8"

- RR-1 UPPER STAGE PAYLOAD CAN CLIMB UP TO 600 FT. RR-2 UPPER STAGE PAYLOAD CAN CLIMB UP TO 1000 FT.
- UPPER STAGE CONVERTS TO FLOATING SPACE STATION AND CAN TAKE UP TO 2 MIN. TO RETURN TO EARTH
- EASY ASSEMBLY – HIGH QUALITY PLASTIC PARTS
- USES A VARIETY OF STANDARD ENGINES
- CUSTOMIZING DECALS INCLUDED

This kit requires assembly. Launch system, engines, glue and finishing materials are not included.

ROTO ROCKET

ROTO-ROCKET CO.
P.O. Box 2878,
Springfield, VA 22152
A DIVISION OF FRONTIER INDUSTRIES, INC.

PAT. PEND.

ROTO-ROCKET CO.

P.O. Box 2878, Springfield, Va. 22152 A DIVISION OF FRONTIER INDUSTRIES, INC.

ASSEMBLY AND FLIGHT INSTRUCTIONS FOR ROTO-ROCKET MODELS RR-1 AND RR-2

The RR-1 kit consists of an Upper Stage and a Main Stage. The RR-2 consists of an Upper Stage and Main Stage plus a Booster Stage. Note: Leave the RR-2 Booster components in the sealed compartment while assembling the other stages to avoid mixing parts.

Flying procedures are similar for both RR-1 and RR-2 Models. Both Models have the same two basic modes of operation, with Mode 1 being for "competitive" flying (without Parachute or Booster), which requires all flying components to remain together throughout flight, and Mode 2 being for "sport" flying. In flying ROTO-ROCKETS, the Sport Mode provides more excitement and will be more challenging; therefore, it should not be attempted until experience has been obtained from the "competitive" Mode. To fly in either Mode, the following items will be needed: Launch Pad, Launch Controller, Wadding, Engines, Masking Tape, Cellophane Tape and Needle Nose Pliers.

Study all instructions carefully before starting to assemble parts. Test-fit parts before gluing. Lightly sand or build up surfaces as needed to obtain proper fits. Remove burrs and excess plastic from molded parts before starting to assemble.

The exploded view on the back of the insert (fig. 1) should be used throughout assembly to aid in parts location and proper orientation. Note that the insert also includes necessary patterns, parts and a list of tools and materials needed for assembly.

FIGURE 1
exploded view on back
of package insert

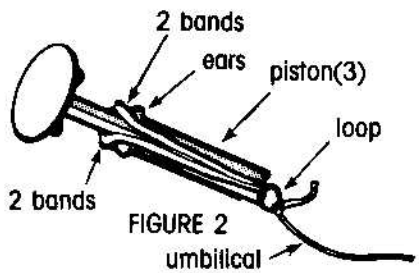


FIGURE 2

UPPER STAGE SPACE STATION ASSEMBLY

STEP 1
Cut 2 feet of string for Umbilical(5). Tie Bands together with an end of the Umbilical using a looped knot to prevent the string from damaging the Bands. Hook 2 Bands over a pair of Piston(3) ears and pull string to seat Bands on bottom of Piston(fig. 2). Drop Umbilical through Base(7), insert Piston and rotate to check for friction from Bands and burrs. If necessary, reseat Bands and remove burrs from side of Piston. When Piston slides and rotates freely, set it aside.

STEP 2
Cement Adaptor(8) to bottom of Base. Check for straightness and let dry.

STEP 3
Center Base ribs between slots in bottom of Lower Body(6) and slide the two together. Drop Umbilical through Base and Adapter and slide Piston into Base.

STEP 4
Trim excess plastic from Retainer(9) holes and sand to remove sharp edges. Pull Umbilical to stretch Bands and insert Retainer between Bands and Adaptor (fig. 3). Slowly release Umbilical to center Retainer in Adaptor. This completes the Lower Body Assembly.

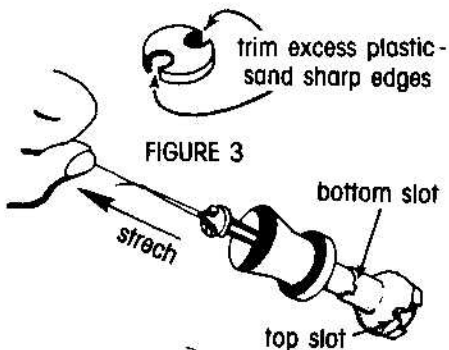


FIGURE 3

STEP 5
Insert Hinges(10) in Vane(11) slots with large end first (fig. 4). Press Vane end over small end of fin until fin is through slot. Note: Be careful not to damage slot or Vane.

STEP 6
Place Adaptor end of Lower Body Assembly on table and lay the Hinge-Vane Assemblies in the Lower Body slots. Rotate Piston to center Hinges between the Piston ears and pull Umbilical to reseat Retainer.

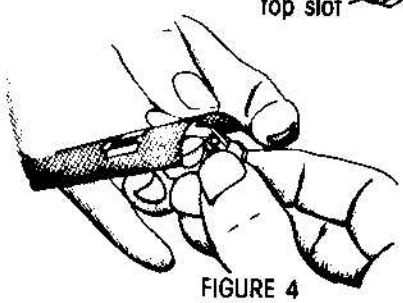


FIGURE 4

STEP 7
Place Upper Body(2) on Lower Body Assembly so that a post is on each side of a Hinge. If a gap exists between Body parts, rotate slightly to seat. Note: Before cementing Body parts, temporarily tape them together to check opening of the Vanes. Do this by holding the Lower Body while pulling the Base down and rotating it slightly to align the Base ribs with the Lower Body slots. This will lock the Base and keep Vanes extended. Next, fold the Vanes into a tube by holding the Upper Body with one hand while pressing on the Hinge fins with the other; then release the Vanes by sliding the hand down the tube and off the end (fig. 5). The Vanes should snap open and stay at an angle slightly above horizontal (fig. 6).

STEP 8
Remove tape and cement Body parts together (fig. 7).

STEP 9
Cement Nose(1) to Upper Body(2) with Nose fins aligned with Hinge fins.

STEP 10
Release tension on Bands and relax Vanes by pulling down on Base and rotating it slightly until Base ribs unlock from slots. Release Base to allow Vanes to fold. ALWAYS STORE UPPER STAGE IN THIS MANNER!

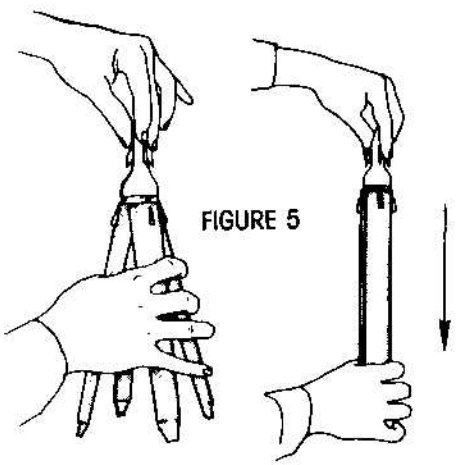


FIGURE 5

MAIN STAGE ASSEMBLY

STEP 1
Test-fit each end of the Inner Body (12) in the Adaptor. If one end fits more easily, install the Centering Ring(16) in the other end. Apply plastic cement to the inside ent of the Inner Body. Lay the Centering Ring on a flat, level surface with the smaller end-opening up. Slowly place the cemented end of the Inner Tube over the Ring and leave in this position until thoroughly dry.

STEP 2
Apply plastic cement around one end of the Engine Tube(18) and insert in Ring until it seats. Be sure the tubes are straight. Stand the Tube Assembly on end to dry.

STEP 3
Cut out Rib Alignment Guide, page 3, and follow directions on back of guide.

STEP 4
Make Ribs(17) by carefully cutting out Main Stage Rib pattern (page 3) using a sharp knife and straight edge. Glue pattern on cardboard in kit with longest edge even with edge of board. Carefully cut board along pattern lines. Use this Rib to cut three more ribs. Stack ribs to check that all are the same as the pattern. Trim and sand if necessary. Apply white glue to the inside edge of a Rib and attach it to the Tube Assembly next to one of the lines drawn on the Engine Tube(18). Allow glue to set and repeat for the other three Ribs. When all are dry, apply glue fillets and allow to dry completely (fig. 8).

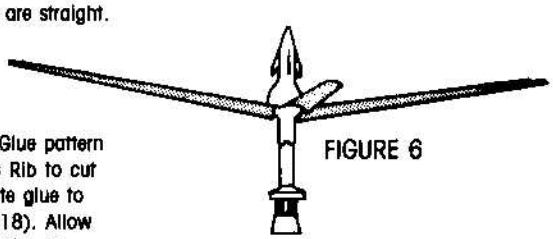


FIGURE 6

MODEL RR-2 BOOSTER ASSEMBLY

STEP 1
Remove Booster parts from the special lower package compartment.

STEP 2
Make Ribs (27) by cutting out Booster Rib pattern (page 3) and use the same instructions provided in Step 4 for cutting the Main Stage Ribs.

STEP 3
Use Rib Alignment Guide that was used in Step 3 of Main Stage to mark Booster Engine Tube (25).

STEP 4
Attach Ribs to Engine Tube as described in Step 4 of Main Stage Assembly.

STEP 5
Mark, cut and attach Fins (28) as described in Step 5 of Main Stage Assembly.

STEP 6
Glue the Rib Assembly into the Fin Assembly as described in Step 6 of the Main Stage Assembly.

STEP 7
Cut out Flame Shroud (29) from back of package insert. Overlap bottom of ends and glue to make a truncated cone. Spray with white paint and glue to bottom of Ribs and Engine Tube.

STEP 8
Check fit of Main Stage with Booster by inserting Main Stage Nozzle into top of Booster. Sand edges of Ribs if necessary for a snug fit.

STEP 9
Use the appropriate Decal as suggested in figures 1 and 12.

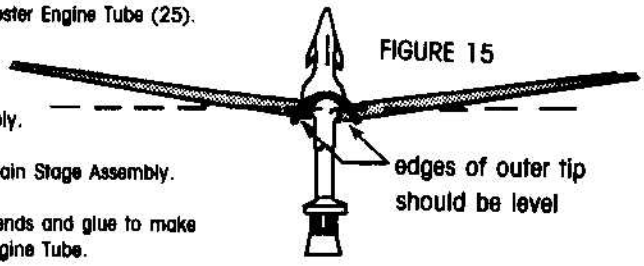
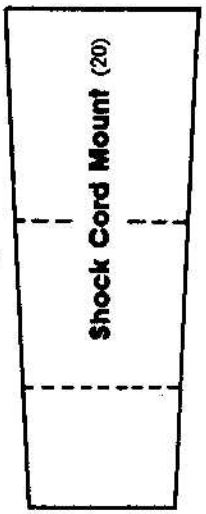
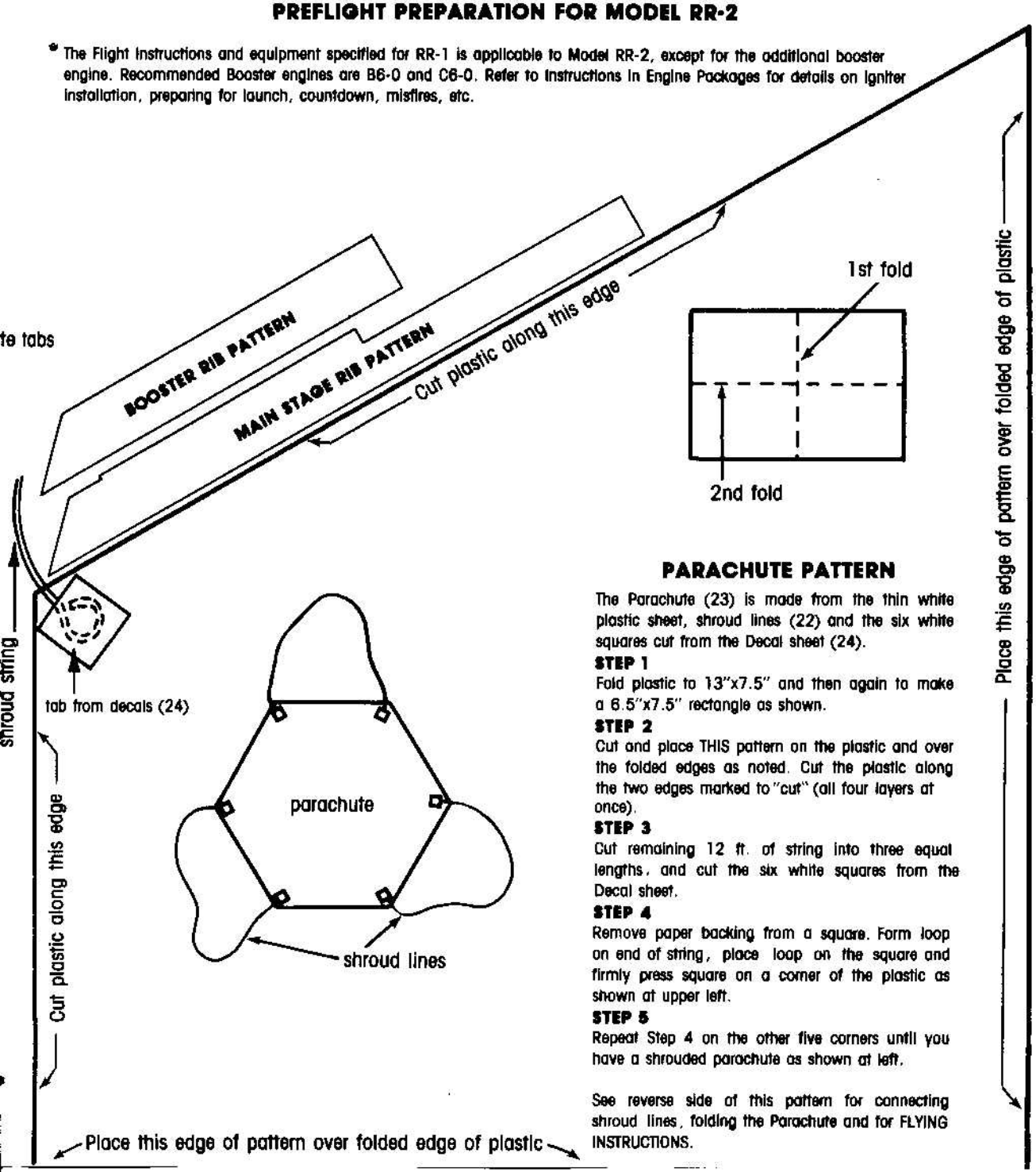


FIGURE 15



PREFLIGHT PREPARATION FOR MODEL RR-2

* The Flight Instructions and equipment specified for RR-1 is applicable to Model RR-2, except for the additional booster engine. Recommended Booster engines are B6-0 and C6-0. Refer to instructions in Engine Packages for details on igniter installation, preparing for launch, countdown, misfires, etc.



PARACHUTE PATTERN

The Parachute (23) is made from the thin white plastic sheet, shroud lines (22) and the six white squares cut from the Decal sheet (24).

STEP 1
Fold plastic to 13"x7.5" and then again to make a 6.5"x7.5" rectangle as shown.

STEP 2
Cut and place THIS pattern on the plastic and over the folded edges as noted. Cut the plastic along the two edges marked to "cut" (all four layers at once).

STEP 3
Cut remaining 12 ft. of string into three equal lengths, and cut the six white squares from the Decal sheet.

STEP 4
Remove paper backing from a square. Form loop on end of string, place loop on the square and firmly press square on a corner of the plastic as shown at upper left.

STEP 5
Repeat Step 4 on the other five corners until you have a shrouded parachute as shown at left.

See reverse side of this pattern for connecting shroud lines, folding the Parachute and for FLYING INSTRUCTIONS.

STEP 5

Cut out one Fin(15) outline from the pattern on back of insert. Use Fin outline to mark balsa as shown on pattern. Carefully cut out Fins(15) and sand surfaces. Cut out Fin Alignment Guide, page 2, and follow instructions on back of guide. Apply white glue to the root edge of a Fin. Attach it to the Outer Body(13) next to one of the lines. Repeat for the Fin on the opposite side of the Body. Check for proper placement and alignment of the two Fins and allow glue to set. Repeat for remaining two Fins and allow glue to dry. Apply glue fillets on all Fins. Allow fillets to dry.

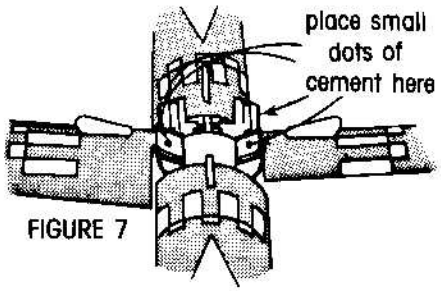


FIGURE 7

STEP 6

Slide the Tube/Rib Assembly into the Fin Assembly to check fit. Carefully sand Ribs if fit is too tight. Remove Fin Assembly and apply white glue to outer edges of Ribs. Quickly slide the Fin Assembly back into the Ribs, taking care to align Ribs and Fins and to leave the last 3/8" of the Ribs sticking out of the bottom of the Outer Tub (fig. 9). Use scrap balsa to apply glue fillets inside Outer Body (fig. 11).

STEP 7

Apply plastic cement in slots between Ribs and Engine Tube and Insert Nozzle (19). Apply cement fillets sparingly around Ribs and Nozzle. Trim Rib point to blend with Nozzle.

STEP 8

Cut out the Shock Cord Mount (20), page 3, and prefold on the dotted lines. Apply glue to small section. Lay the end of cord in place and fold over the section as shown in figure 10. Apply glue to the back-side of the first section and the exposed part of the second section. Lay the cord as shown and fold the cord and middle section over the large section. Glue in Inner Tube as shown in figure 10.

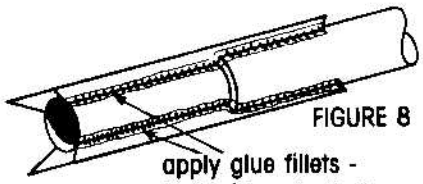


FIGURE 8

STEP 9

Fine sand Fins and apply sanding sealer. Repeat until grain of wood is filled. Finish Fins and Inner Body, except for top 1" of Body, with white spray paint. When paint is completely dry, mask Fins and Inner Body and spray finish Outer Body red. Allow paint to dry completely.

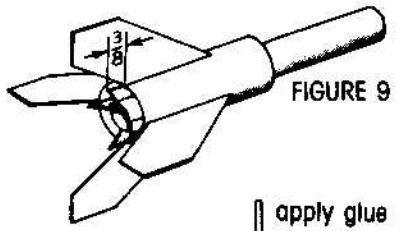


FIGURE 9

STEP 10

Attach Launch Lug to Outer Body at a Fin root with glue (fig.11).

STEP 11

Carefully cut out Decals(24) with sharp knife and a straight edge (fig. 12). Remove paper backing and apply Decals as shown in figure 1. Note: Use ONE fin stripe per fin on Model RR-2 Main Stage and one per fin on Booster Stage. One or two Stripes per fin may be used on RR-1.

STEP 12

Make parachute according to instructions on Parachute Pattern (page 3).

STEP 13

Cut tips of Vanes with scissors according to figure 13, or as necessary to fit Vanes between Ribs.

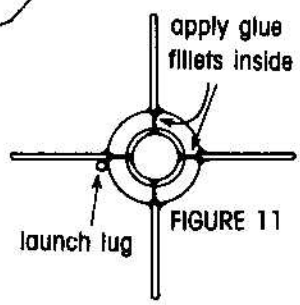


FIGURE 11

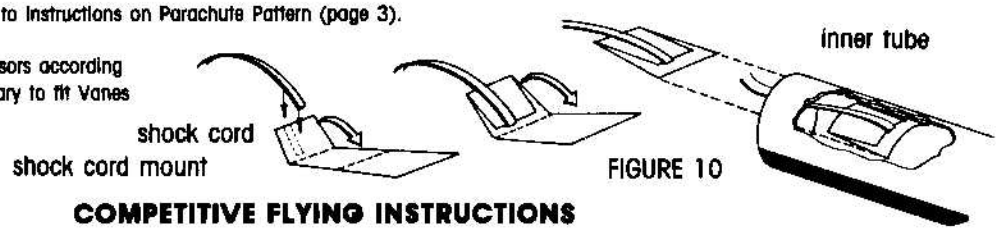


FIGURE 10

COMPETITIVE FLYING INSTRUCTIONS

These instructions apply to both Models RR-1 and RR-2 (without Booster). It is very important that inexperienced Rocketeers get help from Adults or someone that is experienced to assist in checkout of the above assemblies and during first few launches.

STEP 1

Tie Shock Cord (21) securely to loop in free end of Umbilical(5) or preferably to a fishing swivel for quick disconnect with Umbilical.

STEP 2

Crumple and insert 5 sections of Wadding into the Inner Tube, leaving 3" clear at the top of the tube.

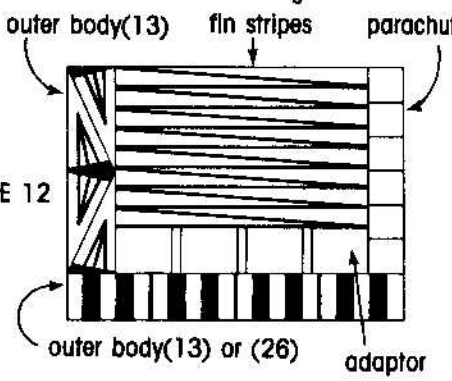


FIGURE 12

STEP 3

To get good fast opening of the Vanes during in-flight separation, check Piston and Hinge alignment by pulling Base below Lower Body to see that a groove between the Piston Ribs is in line with a slot in the Lower Body. If it is not, rotate Piston while holding Body and Base fixed and pull Umbilical until Retainer is free to rotate and reseat. This removes twist in Bands and eliminates interference between Piston ribs and hinges. REPEAT THIS CHECK BEFORE EACH FLIGHT.

STEP 4

With Vanes extended, lower Upper Stage onto Inner Tube, while dropping the Shock Cord and Umbilical String in the Tube, (see FLYING TIPS 1, page 4). Push Adaptor onto tube to check for snug fit and interference from the Cords. If fit is too tight, rotate Tube several times in Adaptor while sliding it in and out to polish surfaces. With Adaptor barely holding Main Stage, align Vanes between Main Stage Ribs, fold Vanes into a tube and push the two Stages together. Make sure that Vanes are inside Outer Body and between Ribs.

STEP 5

Wrap about 2" of ½" or ¾" wide masking tape around both ends of the engine. Insert hollow end of engine into Engine Tube until it seats. Engine will protrude ¼" when seated and cannot be removed with finger tips when proper amount of tape is applied. Recommended Engines: B4-2 (first flight), B6-2 or C6-3. A tight fit between engine and Engine Tube is essential to prevent the engine from being ejected before it causes proper spearation of the Upper and Main Stages.

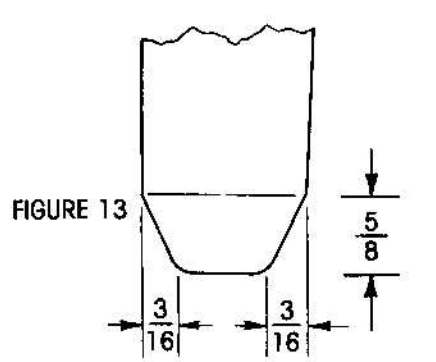


FIGURE 13

STEP 6

Install igniter in engine nozzle according to instructions in engine package.

STEP 7

Place Rocket on Launcher with Launch Lug on vertical Launch Rod and follow Safety Code and count-down procedures supplied with Engines, Launchers and Controller.

SPORT FLYING

These instructions apply to both Models RR-1 and RR-2. IMPORTANT - Do not attempt SPORT FLYING in wind or until vertical separation of Upper and Main Stages has been mastered, (see FLYING TIPS 2, page4).

STEP 1

Make Parachute(23) according to instructions on Parachute pattern, page 3, and install it according to instructions of back of pattern.

STEP 2

Follow Steps 2 through 7 of COMPETITIVE FLYING INSTRUCTIONS.

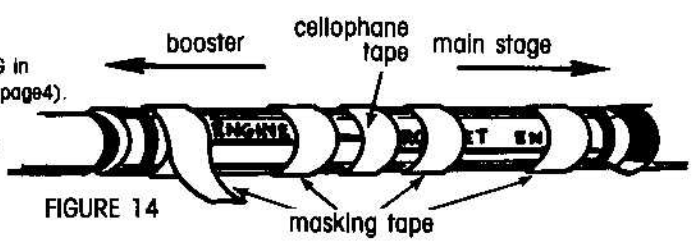


FIGURE 14

shroud string

FLYING INSTRUCTIONS FOR MODEL RR-2 WITH BOOSTER

It is very important that inexperienced Rocketeers get help from Adults or someone that is experienced to assist in checkout of the assembly and to help in the first few launches.

STEP 1

Follow Steps 1 through 4 of COMPETITIVE FLYING for initial and high altitude flights.

STEP 2

Assemble Main Stage and Booster engines by wrapping a single layer of ½" wide cellophane tape tightly around the joint between the engines (fig. 14). Be sure the Booster output end is attached to the Main Stage nozzle end. Wrap masking tape around both engines, as shown. Insert the single stage engine in the Main Stage and then push the Booster onto the Booster engine. The Booster engine should protrude ¼" from the Booster Engine Tube. A tight fit of both engines in Engine Tubes is necessary to prevent the Booster engine from being ejected instead of igniting the Main Stage engine, and for the Main Stage engine remaining in place to provide separation.

STEP 3

Follow Steps 6 & 7 of COMPETITIVE FLYING.

SUPER SPORT FLYING

Follow the same instructions for SPORT FLYING, except use STEP 2 of FLYING INSTRUCTIONS FOR MODEL RR-2 WITH BOOSTER.

FLYING TIPS

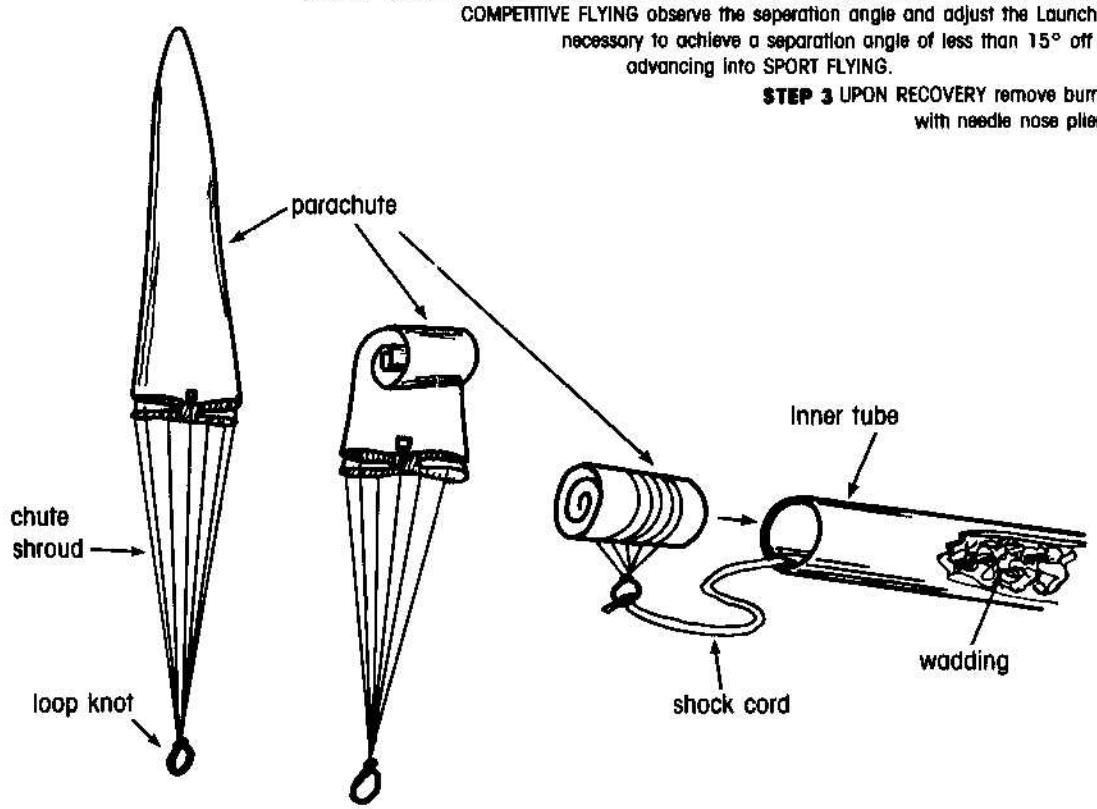
STEP 1

VANE ALIGNMENT is important for best floating action of the Upper Stage SPACE STATION. The outer tips of all Vanes should appear as shown in (fig.15). For each Vane tip that is not level, grasp Vane near Hinge between thumb and forefinger, twist slightly, release and repeat until Vane tip is level. Then fold the vanes into a tube and release them quickly. Check the tips again and if necessary repeat the above with slightly more twist until the tip is level. THIS CHECK SHOULD BE MADE BEFORE EACH FLIGHT !

STEP 2

VERTICAL SEPERATION is very important for the Upper Stage SPACE STATION to descend properly in SPORT FLYING; also, all rubber bands must function properly to give a quick opening of the Vanes at separation. During COMPETITIVE FLYING observe the seperation angle and adjust the Launch Rod angle as necessary to achieve a separation angle of less than 15° off vertical before advancing into SPORT FLYING.

STEP 3 UPON RECOVERY remove burned out engine with needle nose pliers.



1. Wrap around Tube
2. Match lines
3. Mark Tube at arrows
4. Remove guide, draw lines between marks

1. Wrap around Tube
2. Match lines
3. Mark Tube at arrows
4. Remove guide, draw lines between marks

PARACHUTE RECOVERY SYSTEM FOR SPORT AND SUPER SPORT FLYING

Gather all the shroud lines and tie a knot at the extreme end of the group, to form a loop.

Fold the Parachute into a triangular shape. Roll the 'chute tightly as shown above, and wrap the Shroud Lines around it. If 'chute is too large, unroll it and repack until it slides easily into tube. A fit that is too tight may prevent the Parachute from ejecting properly.

NOTE: DO NOT pack Parachute until you are actually ready to launch. For maximum Parachute reliability, lightly dust the 'chute with ordinary talcum powder before each flight, especially in cold weather.

Connect Shock Cord to Shroud loop,with paper clip or fishing line swivel. Pack 'chute, Shroud Lines and Shock Cord neatly into the Inner Tube.


MODEL
RR-2
21" HIGH
WITH
BOOSTER
RECOMMENDED
BOOSTER
ENGINES
B6-0
C6-0


ROCKOMAX

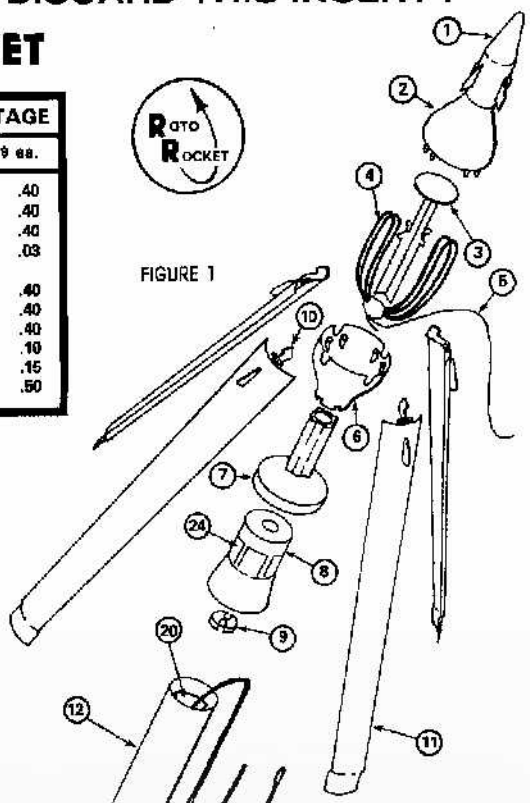
IMPORTANT !
DO NOT DISCARD THIS INSERT !

ROTO-ROCKET

PARTS LIST - UPPER STAGE			
No.	Qty.	Part	¢ ea.
1	1	Nose Cone	.40
2	1	Upper Body	.40
3	1	Piston	.40
4	4	Rubber Bands	.03
5	1*	Umbilical	
6	1	Lower Body	.40
7	1	Base	.40
8	1	Adaptor	.40
9	1	Retainer	.10
10	4	Hinges	.15
11	4	Vanes	.50

ROTO ROCKET

FIGURE 1



TOOLS & MATERIALS NEEDED FOR ASSEMBLY

- Plastic cement
- White glue
- Hobby knife
- Sharp pencil
- Scissors
- Masking tape
- Cellophane tape
- Fine & Med. sand paper
- Red & white paint
- Ruler
- Launch components per instructions

PARTS LIST - MAIN STAGE			
No.	Qty.	Part	¢ ea.
13	1	Outer Body	.65
14	1	Launch Lug	.10
15	4	Fins	.40
16	1	Centering Ring	.40
17	4	Ribs	
18	1	Engine Tube	.30
19	1	Nozzle	.40
20	1	Shock Cord Mt.	
21	1	Shock Cord	.25
22	6"	Shroud Lines	.95
23	1	Parachute	
24	1	Decals (set)	.25

PARTS LIST - RR-2 BOOSTER			
No.	Qty.	Part	¢ ea.
25	1	Engine Tube	.30
26	1	Body Tube	.60
27	4	Ribs	
28	4	Fins	.40
29	1	Flame Shroud	

Flame Shroud

* supplied in one length

** RR-1 only

align this edge with edge of board

Grain

Root

Root

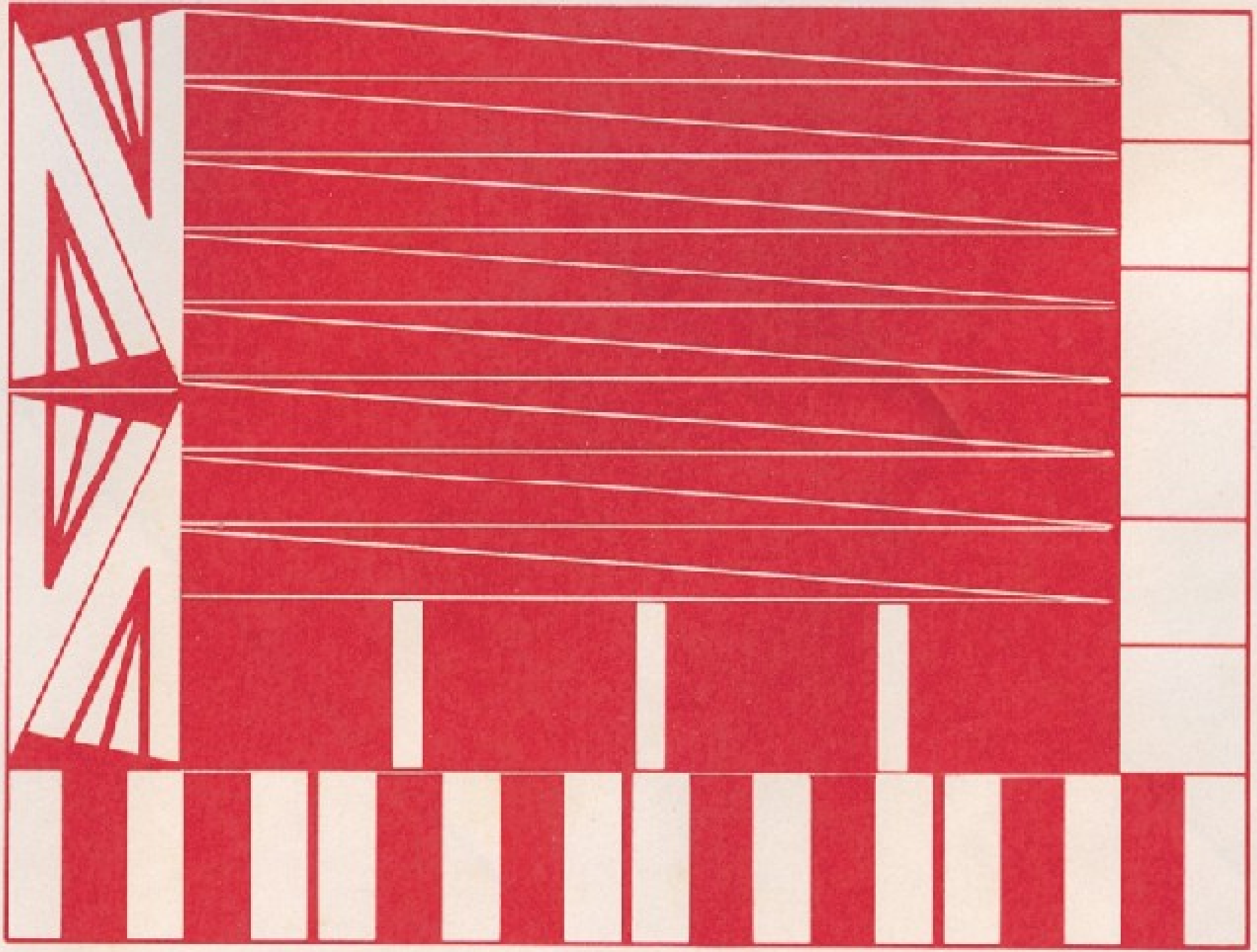
Fin Pattern for parts 15 and 28

Duplicate the above two fins on remaining balsa

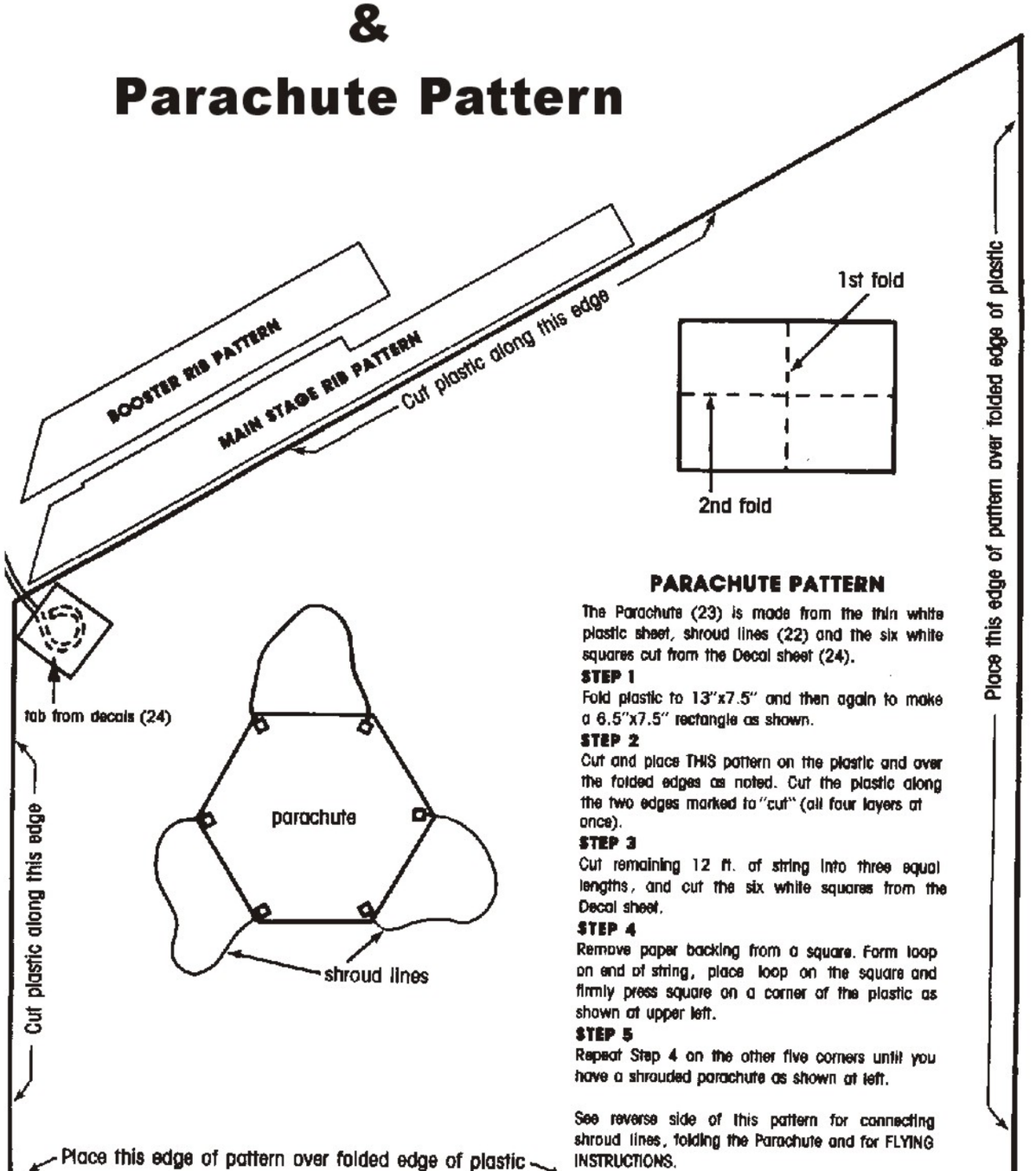
—— HELPFUL HINTS ——

FLYING TIPS: When flying Roto Rocket near water, the Upper Stage can be made to float by adding a styrene collar around Base.

ASSEMBLY TIPS: UPPER STAGE ASSEMBLY--STEP 4--When the Bands are pulled out from the Adaptor, insert a pencil through the loop of each Band to aid in inserting the Retainer.
STEP 7--If Hinge/Vane Assemblies do not freely fall into a tube shape, widen and deepen the Lower Body slots as necessary. If Vanes do not assume the "above horizontal" angle (fig. 6), the inner tip of one or more Vanes may be too long. Carefully remove the Vane from the Hinge and trim off a SMALL amount of Vane with scissors.



Rotating Space Station
Rib
&
Parachute Pattern



PARACHUTE PATTERN

The Parachute (23) is made from the thin white plastic sheet, shroud lines (22) and the six white squares cut from the Decal sheet (24).

STEP 1
Fold plastic to 13"x7.5" and then again to make a 6.5"x7.5" rectangle as shown.

STEP 2
Cut and place THIS pattern on the plastic and over the folded edges as noted. Cut the plastic along the two edges marked to "cut" (all four layers at once).

STEP 3
Cut remaining 12 ft. of string into three equal lengths, and cut the six white squares from the Decal sheet.

STEP 4
Remove paper backing from a square. Form loop on end of string, place loop on the square and firmly press square on a corner of the plastic as shown at upper left.

STEP 5
Repeat Step 4 on the other five corners until you have a shrouded parachute as shown at left.

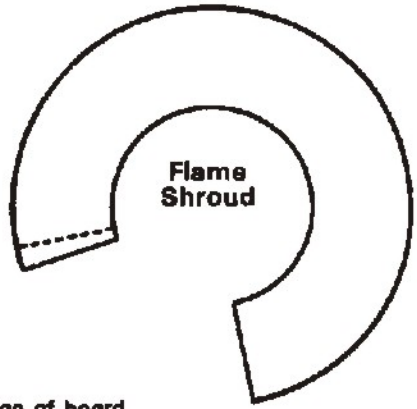
See reverse side of this pattern for connecting shroud lines, folding the Parachute and for FLYING INSTRUCTIONS.

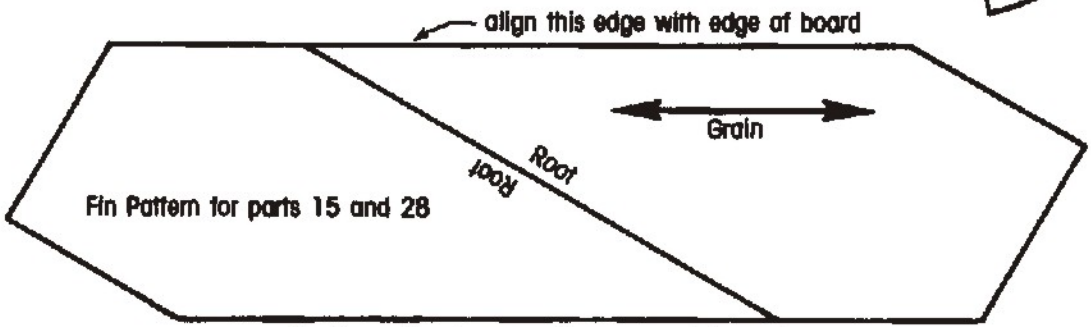
ROTATING SPACE STATION

Fin Patterns

&

Flame Shroud





Duplicate the above two fins on remaining balsa

Rotating Space Station
Shock Cord Mount
&
Fin Guides