

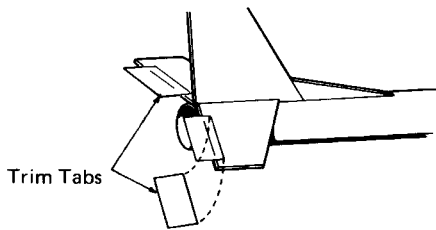


# Centuri SST Shuttle 1 #KC-17/#5077

Q	Desc	Stk Num	Size	Other
1	Plastic Nose Cone	PNC-10?	4.9"L-StoT	See Photo
1	Plastic Nose Cone Base			
1	Plastic Nose Cone	PNC-7?	1.5"L-StoT	See Photo
6	Ramjet Nose Cones	N/C		See Photo
6	Ramjet Tail Cones	N/C		See Photo
1	Body Tube	ST-1010	10.5"L	
1	Body Tube	ST-108	8"L	
1	Coupler	HTC-10	1"L	
1	Body Tube	ST-73	3"L	
1	Body Tube	ST-7	4.9"L	
1	Coupler	HTC-7A	1"L	
2	Body Tube	ST-56	6"L	
4	Body Tube	ST-5	2.5"L	
1	Engine Tube	ST-73	3"L	W/Slot
1	Engine Lock	EL-1		
2	Centering Rings	CR-10		
1	Thrust Ring	TR-7		
2	Launch Lug		3"L x 3/16"ID	
1	Die Cut Disk		.759"Dia	Heavy Card
2	Balsa Sheet (Booster)		3"W x 12"L x 3/32"T	
1	Balsa Sheet (Glider)		3"W x 12"L x 1/16"T	
1	Pattern Sheet	IP-70	Heavy Card	Nozzle & Cockpit
1	Self Stick Sheet	IP-71	Self Stick	Trim Tab Sheet
1	Tape Strip		1.25" x .25"	For Glider Cone
1	Shock Cord	SC-18	24"L x 1/8"W	Elastic
1	Shock Cord Fastener	SCF-1		Self Stick
1	Chute Pack	CP-20	20"	Red/Wht
1	Decal	N/C	3"W x 12"L	Blk/Yel

The glider should now slide easily on and off the rocket tube's coupler.

- 34 Cut out and peel the trim tabs from their backings and mount them on the shuttle's tail as shown.



### PAINTING THE SST-SHUTTLE

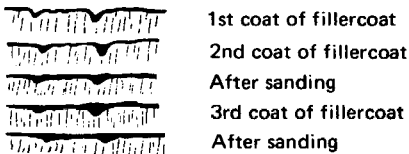
Several steps are required before painting:

- Round all exposed balsa edges with fine sandpaper.
- Sand all balsa surfaces to remove any fuzziness.
- Apply a glue bead along each balsa joint, and smooth into neat fillets with your finger. This is necessary to reinforce the delicate balsa structure.

Paint the fins with balsa fillercoat or sanding sealer and allow to dry. Sand lightly with fine sandpaper. Paint and sand again, repeating the process until all grain line is filled.

**NOTE:** Do not use more than one or two coats of fillercoat on the small shuttle's balsa, or it may become too heavy to glide properly.

#### CROSS SECTIONS OF WOOD SURFACE:



**NOTE:** Be careful not to sand body tubes as this may make them rough!

When painting plastic parts, never use dope or lacquer!

Spray painting your finished model with fast-drying enamel will produce the best results... IF IT IS DONE PROPERLY!!

For best results, spray first with enamel primer.

Most important is the number of coats of paint. **DO NOT** try to paint your model with one heavy coat! Instead, give it a couple of quick, light coats first, **THEN** a finish coat. Let each dry before applying the next.

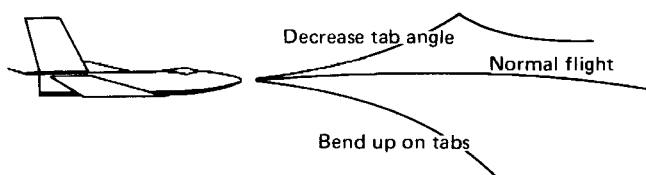
White paint is the recommended color for both vehicles. However, you might consider using a darker color, such as orange or red, on the small shuttle craft. Dark colors are best seen at high altitudes.

Apply the decals following the instructions printed on the reverse side of the decal sheet. Refer to the photos on the package, and elsewhere in this instruction, for placement.

### TEST GLIDING

In a clear outdoor area, hand launch the glider, with a gentle, even movement. If there is a breeze, point the glider into the wind. If the glider dives, bend up on the tabs; if it stalls decrease the tabs angle. If it banks to the right or left, lift up the elevator on the wing opposite the direction of banking. When the glider flies straight ahead without diving or stalling, it is ready for launch.

If you have trouble getting it to glide, be patient... hand-launch gliding takes a little practice.



CONTINUED ON "EXPLODED VIEW SHEET"

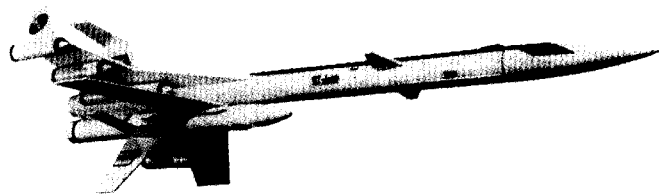
# SST shuttle 1

Catalog No. KC-17

The Centuri SST-Shuttle is based on an actual proposal for a shuttle system that could place up to six tons into earth orbit and fly back to land at a conventional air strip. The backbone of this proposal is the huge super-sonic jet aircraft — the SST — which boosts the shuttle system to the fringes of space.

Centuri's SST-Shuttle blasts into the sky shrinking rapidly to just a small speck. Then a second dot appears — the shuttle craft has separated and is flying back! Flights often last well over a minute. (Look at a clock with a sweep second hand and imagine your bird in the air for a minute and a half!) The SST booster returns by unique parachute system — not hanging but in full flying position.

This rocket is designed to be launched only from standard remote-controlled electrical launch systems. Always use the recommended engines and recovery wadding. Comply with all Federal, State and local laws on launching model rockets.



## MODEL ROCKETEER'S SAFETY CODE

### CONSTRUCTION

My model rockets will be made of only lightweight materials such as paper, wood, plastic, and thin metallic foils, with the exception of payloads and engine holders made of wirelike material.

### ENGINES

I will use only pre-loaded 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.

### 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.

### WEIGHT LIMITS

My model rocket will weigh no more than 453 grams (16 oz.) at liftoff, and the engines will contain no more than 113 (4 oz.) of propellant, as prescribed by Federal Regulations.

### STABILITY

I will check the stability of my model rockets before their first flight except when launching models of already proven stability.

### LAUNCHING SYSTEM

The system I use to launch my rockets will 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.

### 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.

### 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.

### BLAST DEFLECTOR

My launcher will have a blast deflector device to prevent the engine exhaust from hitting the ground directly.

### 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.

### POWER LINES

I will never attempt to recover my rocket from a power line or other dangerous places.

### LAUNCH TARGETS AND 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.

### 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.

### 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.

**TOOLS:** In addition to the parts supplied, you will need the following standard Model Rocket materials to assemble and finish this kit. **DO NOT** use model airplane glue for building flying model rockets.



# ASSEMBLY INSTRUCTIONS

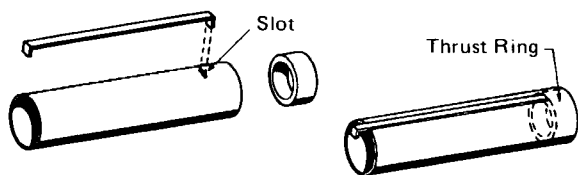
READ BEFORE STARTING ASSEMBLY

The SST-Shuttle is a challenging model rocket to assemble. The assembly steps have been grouped into major categories, to simplify assembly. **SET THE EXPLODED VIEW SHEET NEAR YOU, TO REFER TO AS YOU GO THRU THE INSTRUCTION STEPS.** Read the complete instruction sheet thru before starting assembly!

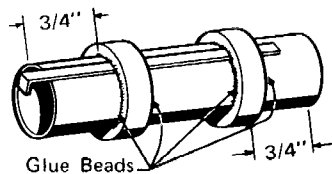
Throughout this instruction sheet the large vehicle will be referred to as the SST, while the small gliding craft is called the SHUTTLE.

## SST BODY & ENGINE MOUNT ASSEMBLY

- Place one end of the engine lock in the pre-cut slot of the 3" engine tube. Apply a bead of glue around the inside of that end. Insert the thrust ring until it butts against the engine lock.



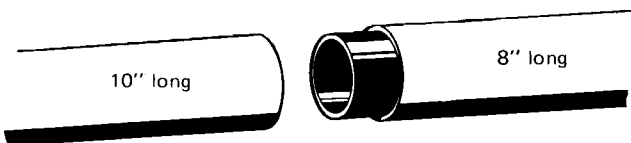
- The two centering rings as shown. Slip over the mounting tube, line up metal engine lock. Glue rings into place 3/4" from each end by applying a glue bead around each joint.



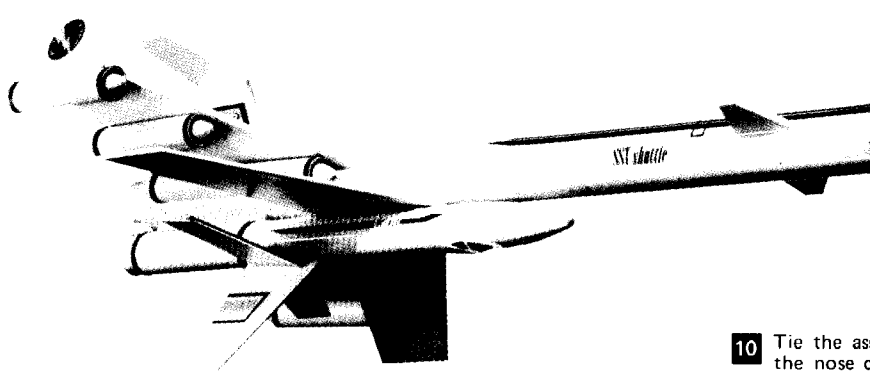
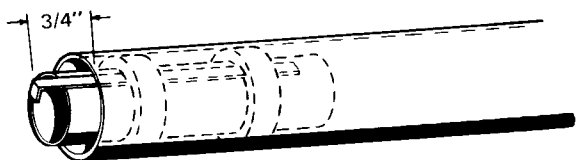
- Run a bead of glue inside one end of each body tube. Insert fishpaper coupler halfway into the 8" tube. Allow the glue at least 15 seconds to start setting.

Apply glue to the outside edge of the fishpaper tube coupler and slide the assembly into the 10" tube. Wipe away excess glue with your finger. Place the joined tubes flat on a table and roll slowly to make sure tubes are in line properly.

### SST BODY TUBES



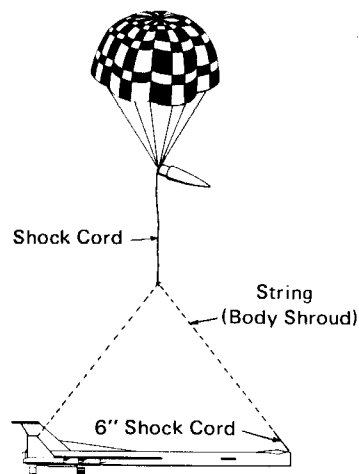
- When the engine mount assembly is dry, apply a generous amount of glue inside the end of the body tube. Push the engine mount into body tube with 3/4" of the engine lock projecting.



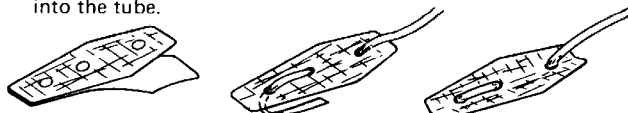
## RECOVERY SYSTEM

- The SST-Shuttle recovery system requires care in assembly. Follow these steps carefully, and your completed model will be able to recover very realistically, hanging in horizontal flying position.

Important!!! From this point on, the engine lock shall lie along the TOP of the rocket body. It is important that this hook is on the top of the body. Keep this in mind as you continue.



- Cut a 6" piece of shock cord. Peel the backing from the shock cord fastener. Thread the end of the shock cord through the fastener as shown. Take care not to touch the adhesive backing any more than absolutely necessary. Slightly crease the fastener lengthwise to allow easy insertion into the tube.



Press end of shock cord against adhesive back of fastener

- Insert the fastener 1" past the body tube, being sure that it is on the same side as the engine lock. Press firmly against the inside wall of the tube with a finger or eraser end of a pencil. **NOTE:** All edges of the fastener must be firmly contacted to the tube to insure a permanent bond. Now, tie the 50" body shroud line onto this shock cord.



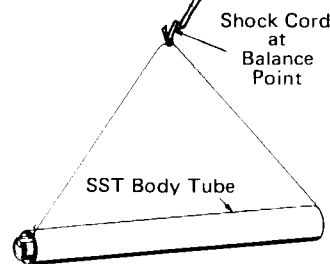
Press fastener firmly into place

- Tie a loop into the other end of the body shroud. This is best done by making a knot around a pencil or paint brush and then pulling the pencil free.



- Slip the loop over the engine lock and let the body tube hang by the body shroud. Adjust the body tube until it hangs parallel to the ground.

Tie one end of the remaining shock cord into the body shroud at the point where the body hangs horizontally. Apply a spot of glue to the knot and allow to dry.



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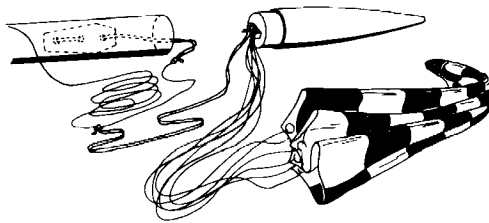
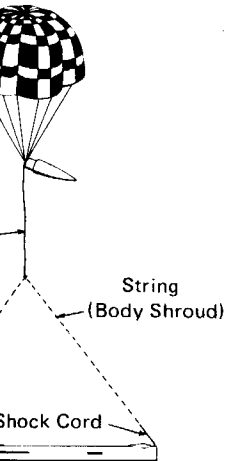
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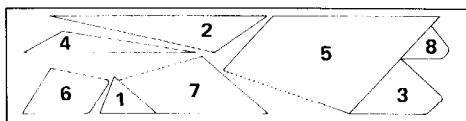


**10** Tie the assembled parachute, and the long shock cord onto the nose cone eyelet. Remove the body shroud line from the engine lock. Roll the entire recovery system neatly and store inside the body tube.



### SST BALSA ASSEMBLY

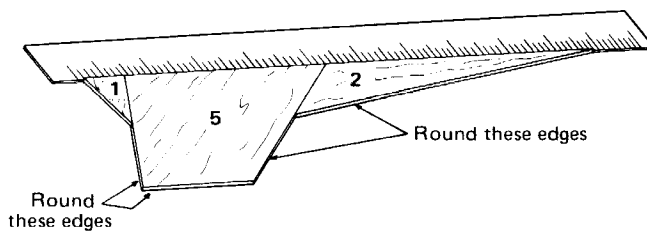
**11** Two of the die-cut balsa sheets are identical. They are used to form the SST wings and tail sections. Study this drawing, and the actual sheets, to determine which part is which. Later, as you need each piece, remove it carefully from its sheet. Use a modeling knife, if necessary to trim pieces out of the sheet.



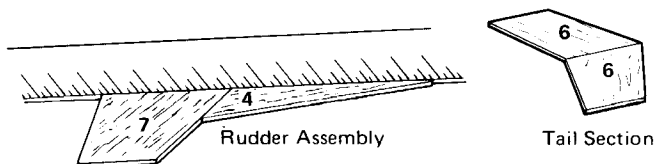
- |                           |           |
|---------------------------|-----------|
| 1. Wing TAILING Extension | 5. Wing   |
| 2. Wing LEADING Extension | 6. Tail   |
| 3. Wing Tab               | 7. Rudder |
| 4. Rudder Extension       | 8. Canard |

**12** Place a wing and wing extensions on a flat surface against a straight edge. Be sure wood grain is aligned as shown. Run a light bead of glue along the connecting edges and press together as shown. Repeat this process with the other wing, allow the assemblies to dry.

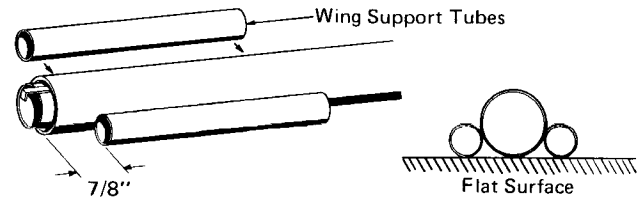
After wing and tail assemblies are dry, lightly sand sides, and round the leading and trailing edges. Do not round root edges or tips.



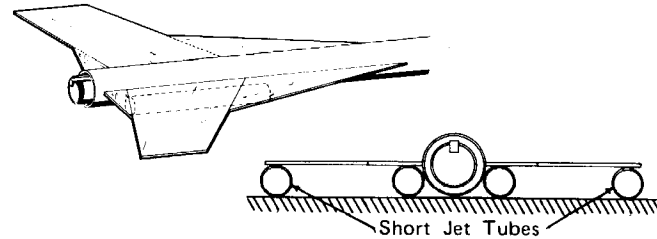
**13** Repeat this process with the rudder and rudder extension. Also, join the tail pieces together. You will note that you have an extra rudder and extension left over. Save them in case you have to repair your SST-Shuttle someday.



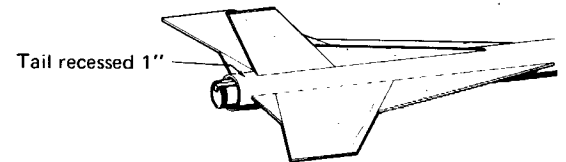
**14** Apply beads of glue along the lengths of the two long wing support tubes. Lie the body tube on a flat surface and press the support tubes in place as shown.



**15** Apply beads of glue to the top of each support tube and to the root edges of the wings. Press the wings into place using the support tubes as a guide as shown. Put a jet tube (do not glue) under each wing for support until wing is dry.



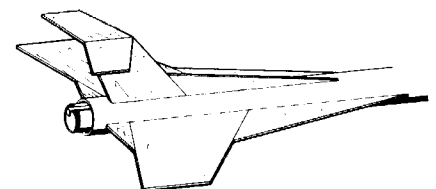
**16** Glue the tail in place taking care to center it on the body tube between the wings and making sure it is in line with the body tube. Stand the body tube on end and allow to dry.



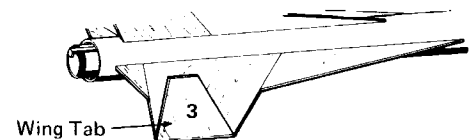
**17** When the assembly is dry enough to handle, apply glue to the root edges of the canards and press them into place 4" from the nose along the same axis as the wings. Sight along the body tube to make sure the canards are in line.



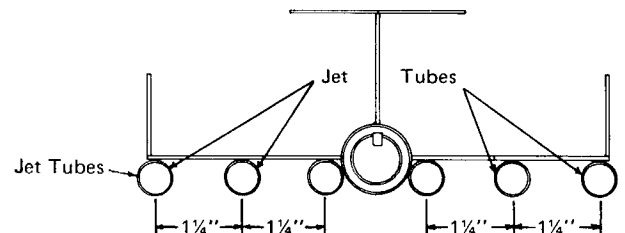
**18** Glue the tail section in place atop the rudder. Sight along model to be sure the tail is aligned neatly.



**19** Run a bead of glue along the root edge of each wing tab and press into place on the top of each wing tip. Check for neat alignment as shown in step 20 endview.



**20** Glue the jet tubes into place parallel to the body tube as shown in the end view, and the next step.



Backing from the shock cord not to touch the necessary. Slightly easy insertion

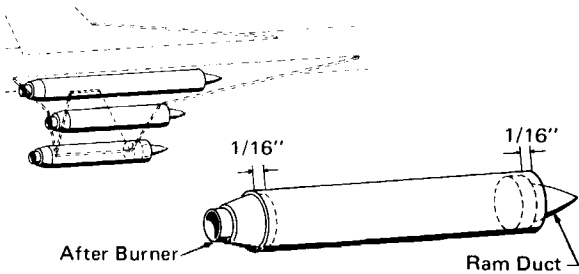
ing sure that it is firmly against the end of a pencil. firmly contacted low, tie the 50"

shroud. This is oil or paint brush

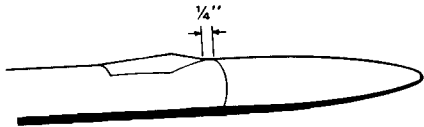
Shock Cord at Balance Point

Body Tube

**21** Glue the ram ducts and after-burners in place in the jet tubes, using ordinary model rocket glue. First run a small bead of glue into tube, insert the plastic duct or after-burner and recess it about 1/16", then run a small glue bead around the recess.

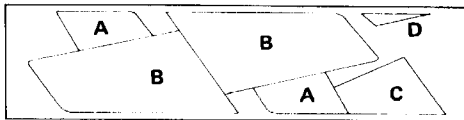


**22** Cut the large cockpit from the printed sheet and assemble it according to the instructions printed on the sheet. Glue the cockpit on the top of the body tube as shown. Hold the cockpit in place with your fingers until the glue sets.



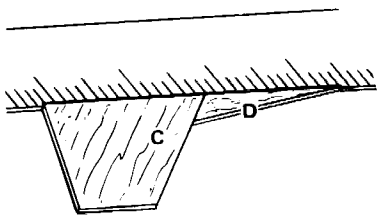
### SHUTTLE CRAFT ASSEMBLY

**23** The remaining balsa sheet will be used for the shuttle craft. Study this drawing to identify the various parts.

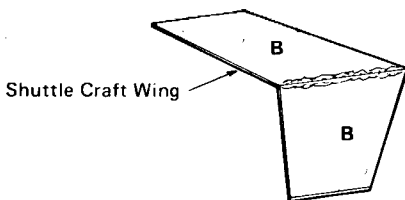


- A. Tail (2)
- B. Wing (2)
- C. Rudder
- D. Extension

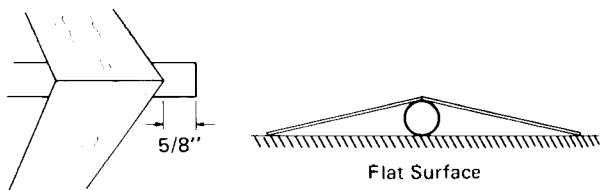
**24** Glue the rudder and its extension together, against a straight edge.



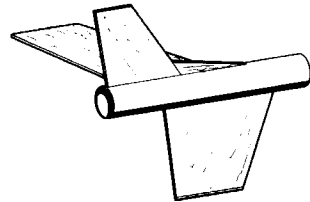
**25** Run a bead of glue on the root edges of the wings and press them together. Apply glue to the tops of the wings on both sides of the joint.



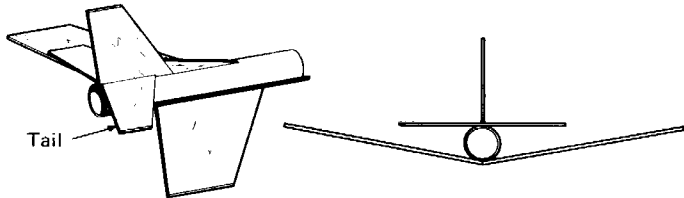
**26** Turn the wings upside down and lay the assembly on the glider body tube the leading edge 5/8" from the forward end of the body tube. Press gently down on the wing tips until the tips touch the table. Assembling the glider upside down builds in the required dihedral.



**27** When the assembly is dry enough to handle turn it right side up. Glue the rudder section to the body tube making sure it is lined up with the long axis of the glider. Allow glue to dry.

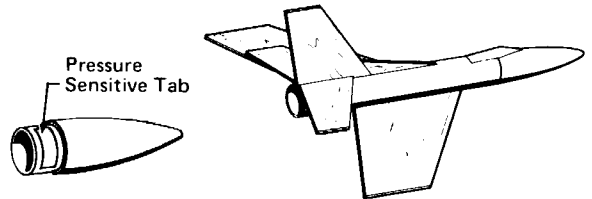


**28** Apply glue to the root edges of the tails and press into place along the tail-body tube joint. Align trailing edge of the tail with rudder. Check end view for proper alignment.



**29** To provide the proper glueing surface, apply the small pressure sensitive tab (or a piece of masking tape) to the small nose cone's base. Glue nose cone in place. Cut the small Shuttle craft's cockpit from the printed sheet and assemble according to its printed instructions. Let dry before going on.

Apply glue to the inside edge of the cockpit and press it into place as shown, holding it down firmly until the glue sets.

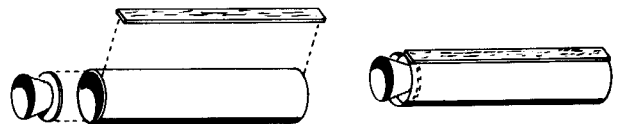


### ROCKET TUBE ASSEMBLY

**30** Cut the rocket nozzle from the printed sheet and assemble following the included instructions. Glue the nozzle onto the die cut disc. Allow to dry.



**31** Cut a strip of unused fin material 3" long by 3/16" and glue it to the 3" rocket tube. Glue the nozzle assembly in place recessing it 1/8" in the rocket tube.

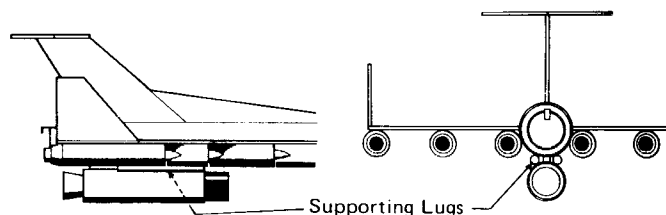


**32** Glue the small fishpaper coupler into the forward end of the rocket tube as shown. Be sure the coupler is centered.

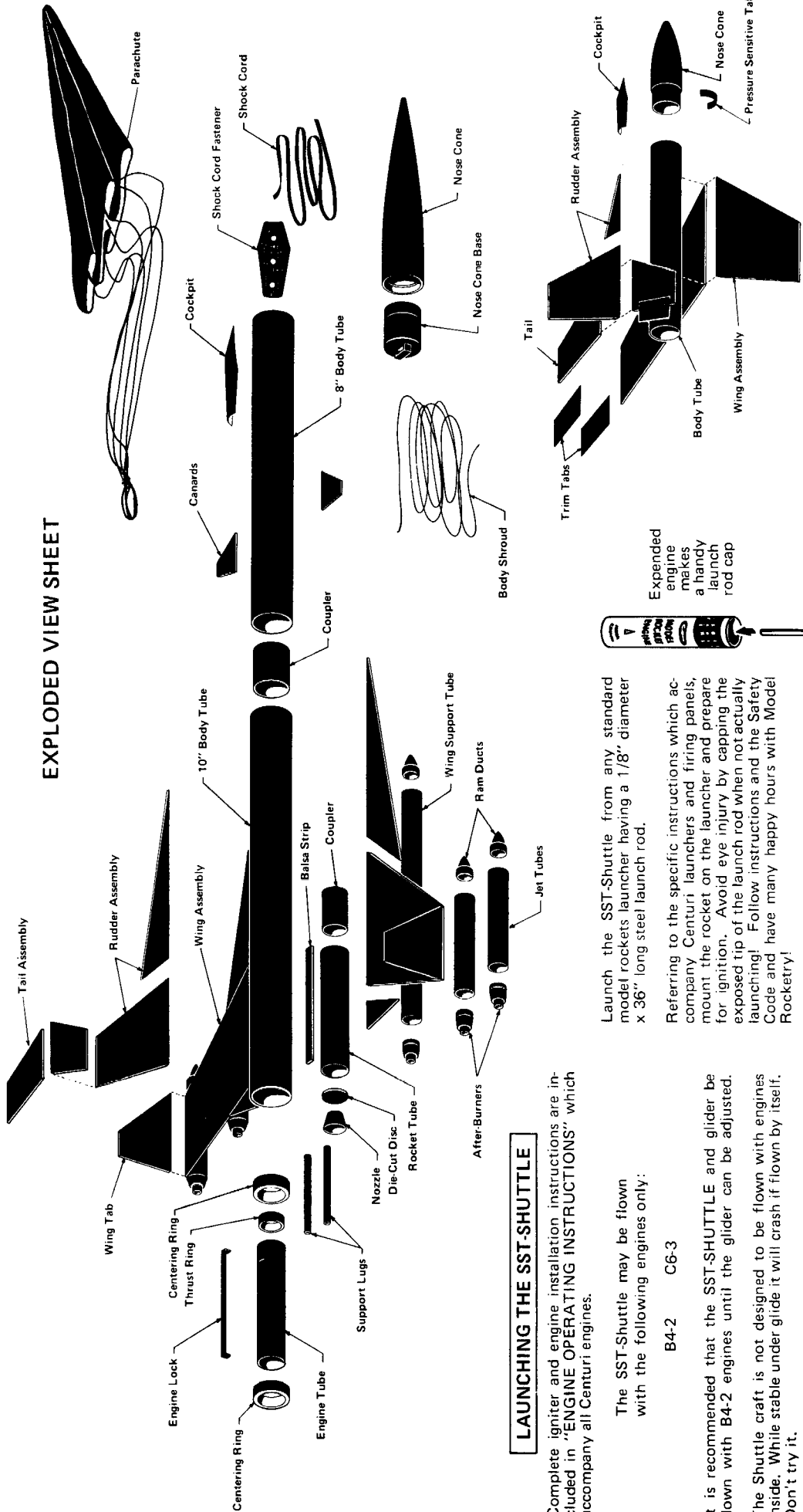


**33** Glue the rocket tube to the body of the SST as shown.

Apply glue to edges of the supporting lugs and press into place on both sides of the rocket body as shown. Allow to dry. NOTE: One of these supports will be used as a launch lug.



# EXPLODED VIEW SHEET



## LAUNCHING THE SST-SHUTTLE

Complete igniter and engine installation instructions are included in "ENGINE OPERATING INSTRUCTIONS" which accompany all Centuri engines.

The SST-Shuttle may be flown with the following engines only:

- B4-2
- C6-3

It is recommended that the SST-SHUTTLE and glider be flown with B4-2 engines until the glider can be adjusted.

The Shuttle craft is not designed to be flown with engines inside. While stable under glide it will crash if flown by itself. Don't try it.

Prepare the vehicle for flight as explained here. Use extra care in packing the recovery system, as it is more complicated than most.

- Attach body shroud to engine lock.
- Prepare and insert engine
- Insert recommended amount of flameproof chute wadding
- Insert recovery system lines
- Roll chute neatly and insert
- Socket nose cone in place (fit should be snug)
- Mount glider (shuttle) onto rocket tube
- Position SST-Shuttle on launch rod, using one of the support lugs as a launch lug.

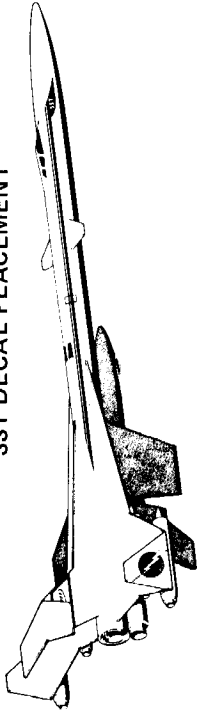
Launch the SST-Shuttle from any standard model rockets launcher having a 1/8" diameter x 36" long steel launch rod.

Referring to the specific instructions which accompany Centuri launchers and firing panels, mount the rocket on the launcher and prepare for ignition. Avoid eye injury by capping the exposed tip of the launch rod when not actually launching! Follow instructions and the Safety Code and have many happy hours with Model Rocketry!



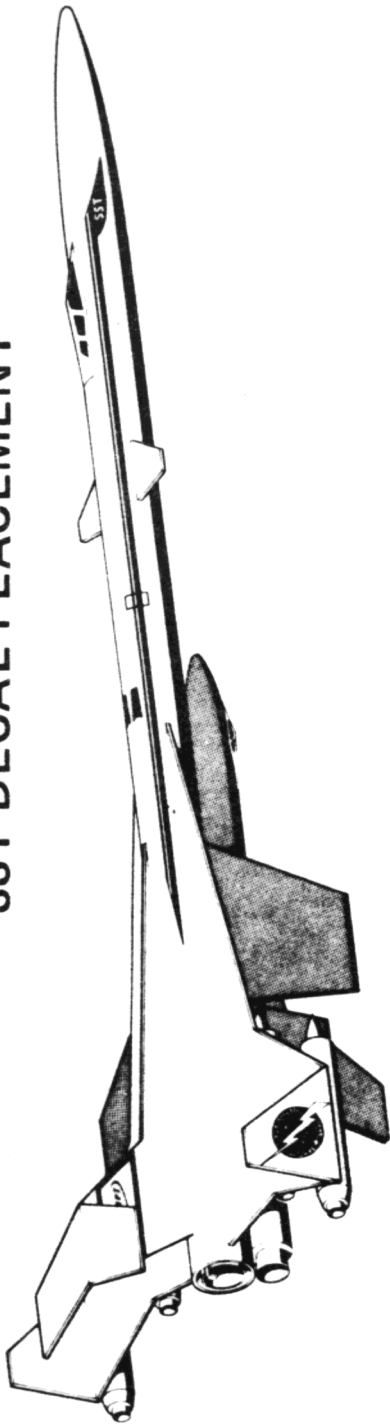
Expanded engine makes a handy launch rod cap

## SST DECAL PLACEMENT



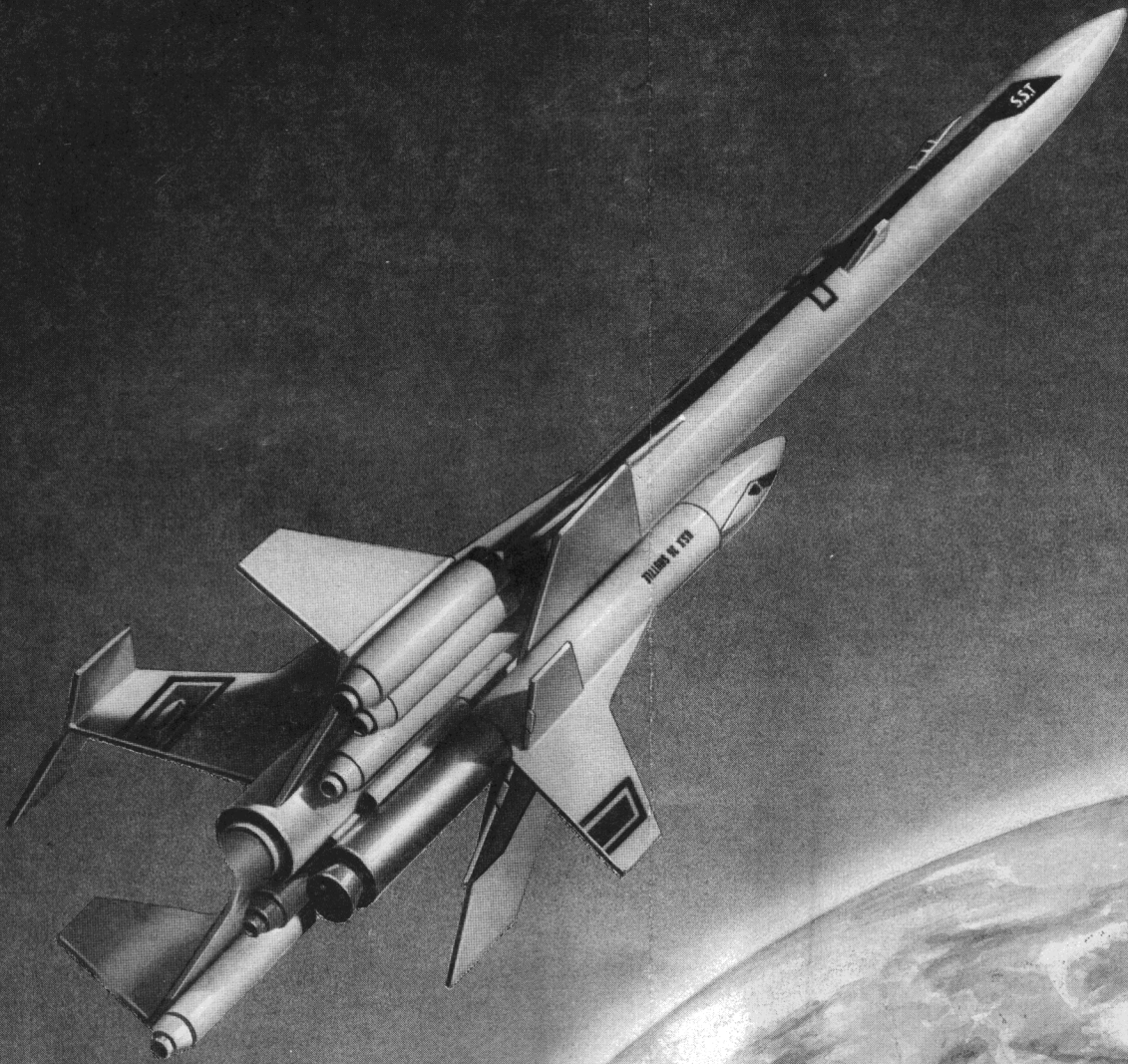
CENTURI ENGINEERING COMPANY  
P.O. Box 1988, Phoenix, Arizona 85001

# SST DECAL PLACEMENT





# *The SST shuttle concept*



# A TYPICAL

A huge super-sonic transport lumbers down the runway. Clouds of white smoke suddenly gush from a battery of Jato units, the vehicle gathers speed rapidly. The assist units drop away and with a piercing scream the huge plane begins to climb. This is not an ordinary flight for the SST. Under its belly lies a large rocket airplane; behind the airplane, gleaming silver in the sun, are the two solid fuel rocket stages. . .

The SST rapidly shrinks to a small speck in the distance. As it gathers speed it continues to climb until at over sixty thousand feet it flashes along at over one thousand, five hundred miles per hour. Traces of gas can be found at altitudes of over 100 miles, but the ship is flying over 75% of the Earth's atmosphere at this moment.

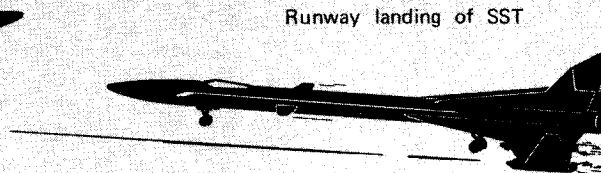
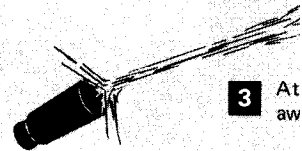
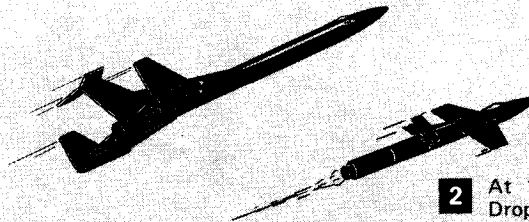
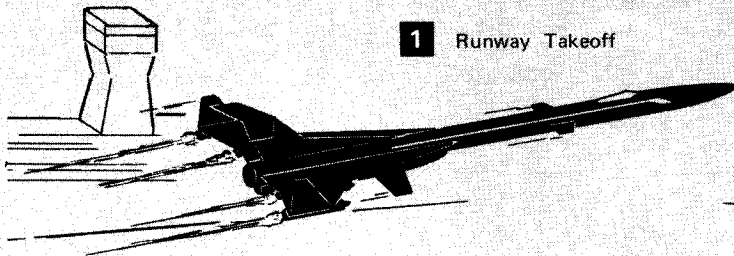
Inside the shuttlecraft a countdown is near completion for its four passengers. Aboard are the pilot, co-pilot, a weather analyst and a technician. In the hold are instruments, some T.V. equipment and other supplies including a small bag of mail. Far above them and thousands of miles away an orbiting laboratory is making ready for their arrival.

"T minus 2 minutes!"

The last checks are complete; the mother ship begins a final climb.

"10 seconds and counting!" . . . 9 . . . 8 . . . 7 . . . latches holding the shuttlecraft and its solid booster stages are retracting . . . 6 . . . 5 . . . RELEASE! Slowly and silently the shuttle system drops away. The shuttle will fall for four seconds while the SST banks away. FIRE! The first solid fuel stage roars to life. The acceleration slams the passengers back into their contoured seats. For a few minutes the ride will be strenuous; fortunately it will also be brief. The rocket climbs rapidly at first then pitches down into a path paralleling the curvature of the Earth as the speed builds up . . . five thousand miles per hour . . . six thousand . . . sixty eight hundred . . . There is a lurch as the first engine falls away and the second motor begins to fire. The spacecraft's velocity continues to rise . . . seven thousand, eight . . . ten . . . twelve . . . thirteen thousand miles per hour! At this point the acceleration eases off. The second solid fuel engine has

FLIGHT SPEED SCHEDULE	ACQUIRED SPEED	GAINED SPEED THIS BURN	SPEED STILL NEEDED FOR ORBIT
SST	0	1,500 mph	16,500 mph
SOLID FUEL STAGE 1	1,500 mph	4,500 mph	12,000 mph
SOLID FUEL STAGE 2	6,000 mph	6,500 mph	5,500 mph
SHUTTLE CRAFT	12,500 mph	5,500 mph	0



# MISSION

burned out. The spacecraft will coast briefly before the rocket engine in the shuttle fires. The pilot reports he has communication with the space station behind and above him. Now the hydrogen - oxygen engine in the shuttle begins to fire. The acceleration is easier to take and the speed gradually climbs to the orbital speed of 18,000 miles per hour. The pilot effects a rendezvous firing small thrusters and links up - a hundred miles above the Earth with the orbital station.

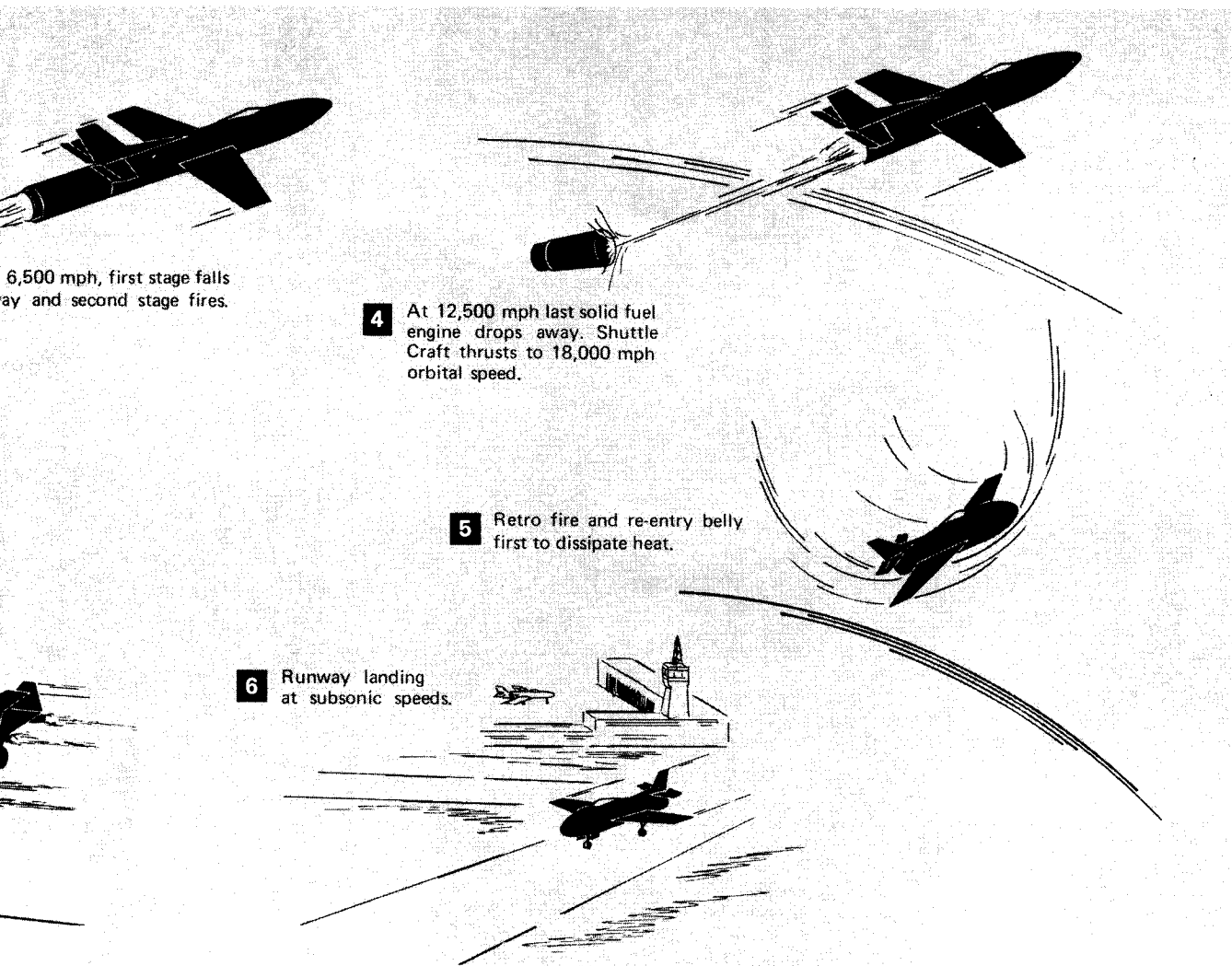
Later the shuttle will disengage from the space station and reenter the earth's atmosphere nose-up, presenting its flat undersurface as a heat shield until sufficient heat and speed are lost. At the desired speed the nose pitches down and the shuttle flies to a runway landing at a conventional airfield.

In addition to testing many principles and systems for the more ambitious Space Shuttle an SST-Shuttle could reliably and economically:

- 1) Orbit several men (say 4), rendezvous with a space station, and return.

- 2) Service and repair satellites.
- 3) Orbit weather and communications satellites more cheaply than present satellite launch vehicles with the additional advantage of cruising to any point on the planet prior to launch to achieve special orbits.
- 4) Orbit two men for extended missions in space.
- 5) Inspect suspicious or menacing satellites orbited by foreign powers.

Finally the SST shuttle system would require none of the expensive ground support equipment required by a rocket system; the first step to earth orbit would be made from a conventional runway. Such a system would seem to offer much service at minimal cost for at least a decade of aerospace progress.



6,500 mph, first stage falls away and second stage fires.

**4** At 12,500 mph last solid fuel engine drops away. Shuttle Craft thrusts to 18,000 mph orbital speed.

**5** Retro fire and re-entry belly first to dissipate heat.

**6** Runway landing at subsonic speeds.

## *The SST shuttle concept*

The United States Space Program as it enters the Seventies is swinging into a new phase that promises to dramatically revolutionize man's role in Space.

The Sixties saw the entry of man into space experimentally climaxed by a bold step to the moon, proving that man could survive in space and operate there successfully. The decade to come will see space flights become routine. The cornerstone of operational (as opposed to experimental) space flight is an economical transportation system with principal components that can be used many times.

The National Aeronautics and Space Administration (NASA) is currently studying a variety of proposals for an economical system to deliver men and payloads to and from earth orbit. The term "Space Shuttle" has been given to this operational system. Current concepts call for a two stage vehicle weighing three and a half million pounds. Both stages would be winged and would land at airfields to be refurbished and used again. Such a plan is ambitious to say the least and will not begin to pay off for a number of years.

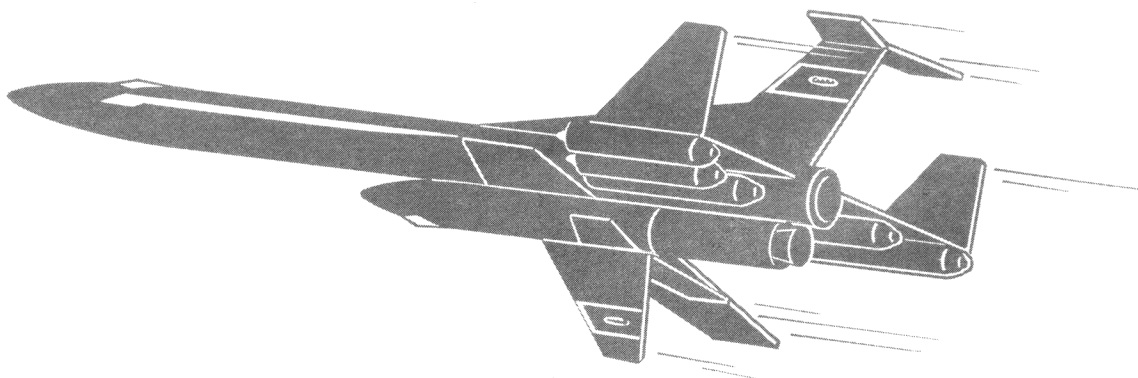
The Centuri SST - Shuttle is a model representation of a possible shortcut that would provide an economical means of launching light to moderate payloads of several men into earth orbit.

Such a shuttle, were it built, could be based on the following components:

(1) A B-70 or other large high performance jet aircraft, perhaps boosted at takeoff by Jato units. A modified SST might prove ideal for this.

(2) A rocket airplane — much larger than the X-15 though smaller than current shuttle proposals. Weight in orbit would be on the order of 12,000 pounds. The ship would contain a cargo bay for payloads of several passengers.

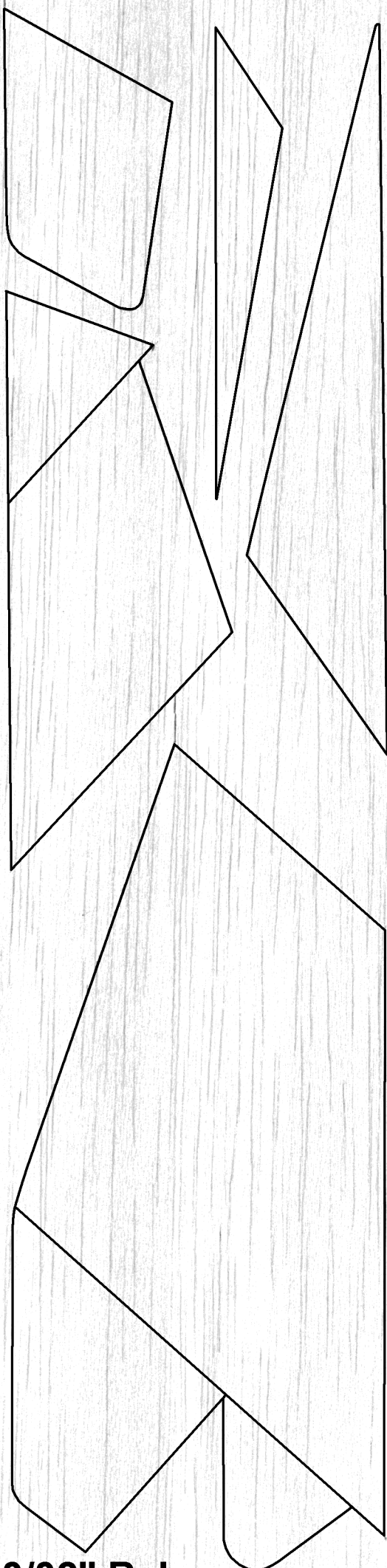
(3) A two stage expendable intermediate vehicle which would boost the shuttle craft from Mach 2.5 at the upper limits of the atmosphere to 13,000 mph. These stages would not be recovered. The shuttle craft would add the 5,000 mph necessary to achieve orbit. Naturally, the mother ship would be re-usable as would the shuttle craft after some refurbishment. Only the two solid fuel stages, moderate in size, would be jettisoned.



**Centuri**

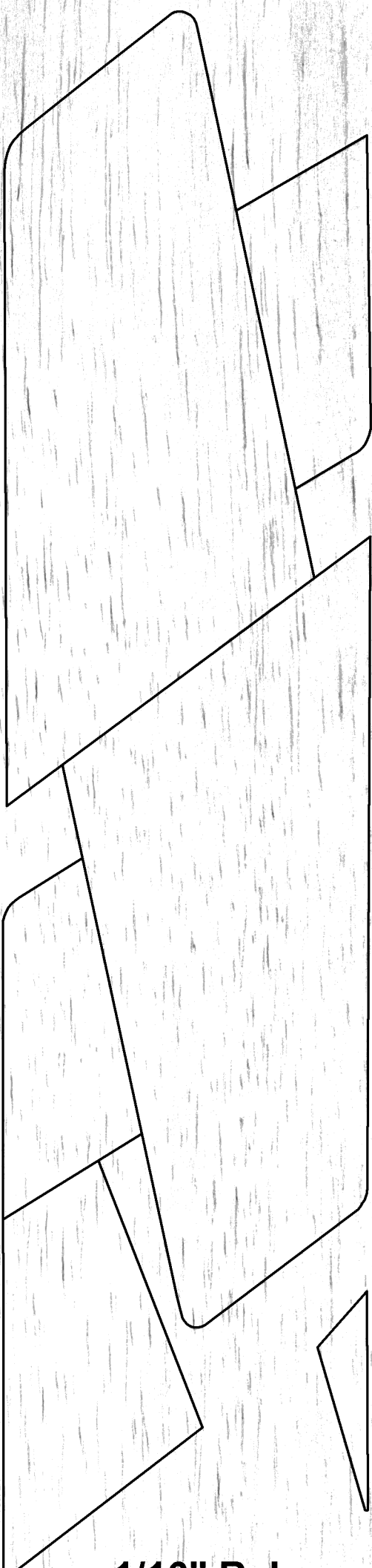
CENTURI ENGINEERING COMPANY

P. O. BOX 1988 PHOENIX, ARIZONA 85001



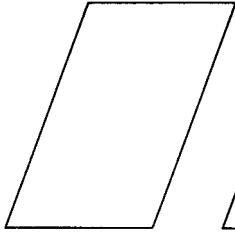
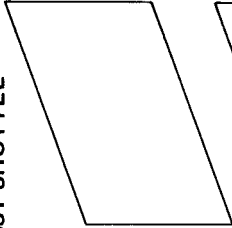
**3/32" Balsa  
2 Required**



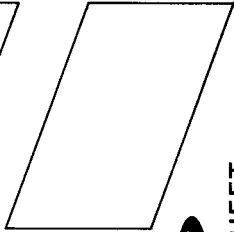
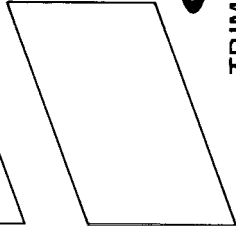


**1/16" Balsa**

**SST SHUTTLE**

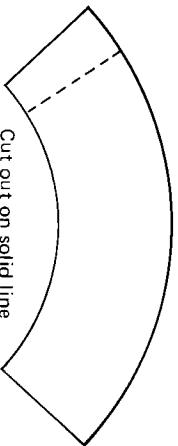


**TRIM TAB SHEET**



**IP-71**

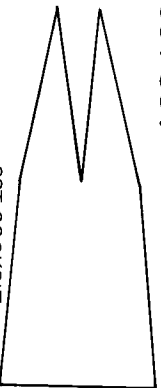
## NOZZLE & COCKPIT CUT-OUT



Cut out on solid line



Roll the nozzle into a ring and glue ends together as indicated. Before the glue has completely set, slip the nozzle in place and adjust for a tight fit.

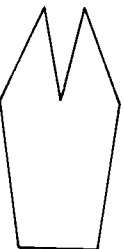


SST COCKPIT



SST SHUTTLE

IP-70



SHUTTLE CRAFT COCKPIT

Carefully cut out the cockpits. Press the front edges together and run a bead of glue along the inside edge. Hold until glue sets.



SST



USX - 36 SHUTTLE



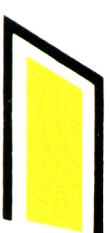
USX - 36 SHUTTLE

SST



SST Shuttle

SST Shuttle



1 Inch

