

# BLACK BRANT IV

## ASSEMBLY INSTRUCTIONS

READ THESE INSTRUCTIONS CAREFULLY  
BEFORE YOU START BUILDING

Additional materials and tools  
required for construction:

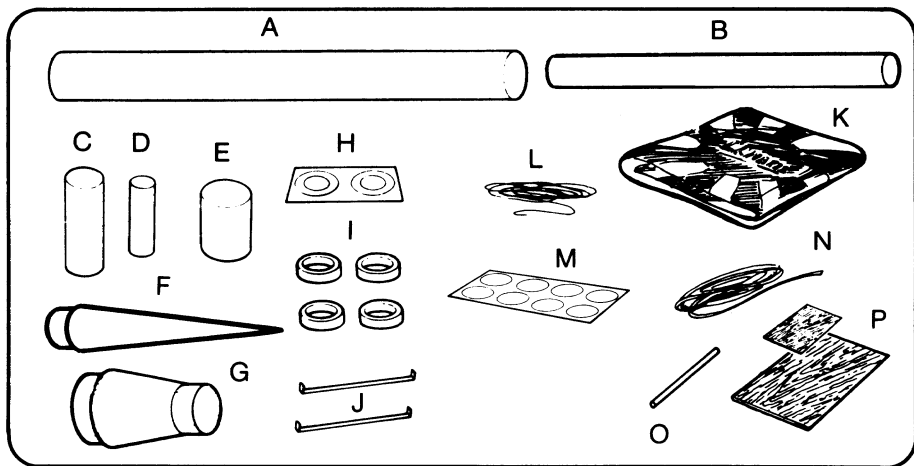
- modelling knife or  
single edge razor blade
- white glue
- fine sandpaper
- butyrate dope
- cornstarch or talc
- sanding block
- masking tape
- paint - gloss cherry red
- paint - gloss white
- scissors
- ruler
- pencil

Additional items required to  
fly the Black Brant IV are:

- Heat Wadding
- Trans-A-Pad Launcher
- Countdown Controller
- Canaroc Engines
- masking tape

### PARTS LIST

- |                                  |                                 |
|----------------------------------|---------------------------------|
| A) 1 - PT-400 Body Tube (54.4cm) | K) 1 - Parachute (45cm)         |
| B) 1 - PT-200 Body Tube (35.2cm) | L) 1 - Shroud Line              |
| C) 1 - ET-200 Engine Tube        | M) 8 - Tape Disks               |
| D) 1 - ET-100 Engine Tube        | N) 1 - Shock Cord               |
| E) 1 - CT-400 Coupler Tube       | O) 1 - Launch Lug               |
| F) 1 - BN-200B Nose Cone         | P) 2 - Balsa Sheets             |
| G) 1 - BA-2040A Adapter          | Q) 2 - Decal Sheets (not shown) |
| H) 2 - Centering Disks           |                                 |
| I) 4 - Centering Rings           |                                 |
| J) 2 - Engine Retainers          |                                 |



# CONSTRUCT THE ENGINE MOUNT

A Cut a slit in the large diameter engine tube (ET-200) 7mm from one end (Fig. 1).

B Poke one end of the engine retainer into the slit. Put a double wrap of masking tape around the middle of the engine tube to hold the retainer in place (Fig. 2).

C Smear glue around the inside of the upper end of the engine tube, and slide one of the centering rings into place, sitting against the bent end of the retainer. This will act as a "fail-safe" engine block (Fig. 3).

D Glue a centering disk to one end of the coupler tube (Fig. 4). Cut a 5mm x 5mm notch from the remaining disk (Fig. 5).

E Slide the engine tube into the centering disk on the coupler tube, then slide the notched centering disk on the end of the engine tube and glue it into position on the coupler tube (Fig. 6). Center the coupler on the engine tube (leave the same amount of engine tube sticking out from either end). Apply a thick coat of glue to make a strong joint between the centering disks and engine tube (Fig. 7).

Fig. 1

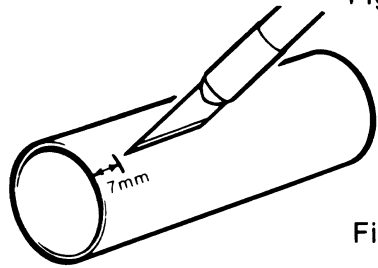


Fig. 2

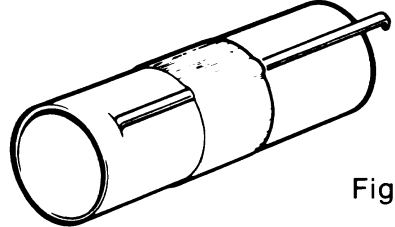


Fig. 3

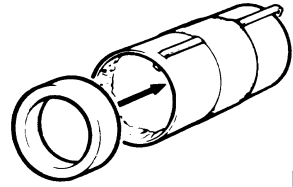


Fig. 4

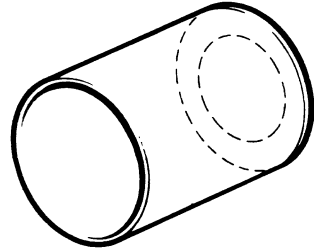


Fig. 5

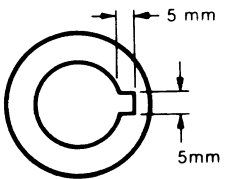


Fig. 6

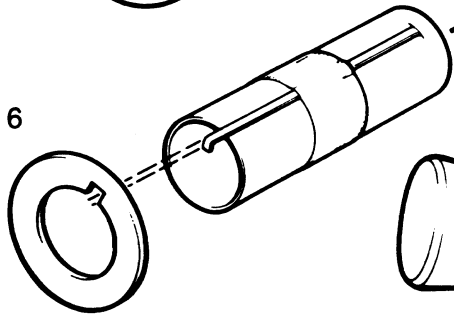
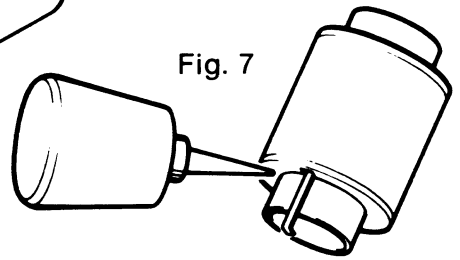
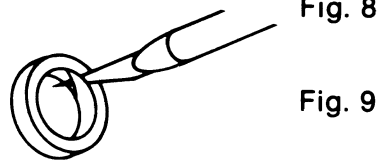


Fig. 7

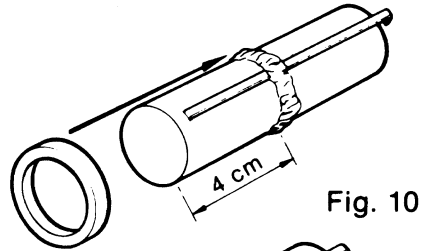


## CONSTRUCT THE ENGINE ADAPTER (for 18mm engines)

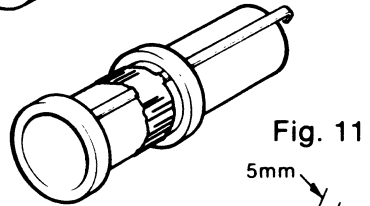
A Cut a slit 7mm from the end of the small engine tube (ET-100). Push the end of the engine retainer into the slit.



B Test fit a centering ring to slide onto the tube, and over the engine retainer. If it will not slide easily, then peel a layer of paper from the inside of the ring (Fig. 8). Smear glue around the middle of the tube on the outside, and slide the centering ring over the retainer and onto the glue (Fig. 9).

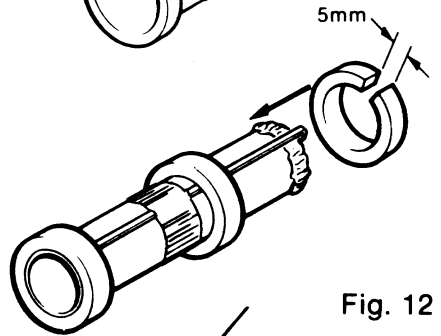


C Glue a centering ring onto the front of the tube so that it is flush with the end (Fig. 10).

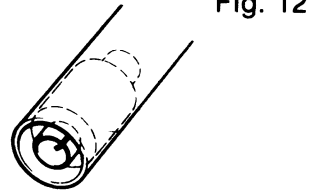


D Put a double wrap of masking tape around the engine tube between the two centering rings. This will help keep the retainer from being pushed forward.

E Cut a 5mm wide section from the last centering ring (Fig. 11). Smear glue around the outside of the tube at the rear, and slide the centering ring into place. Position it to be flush with the end of the tube.



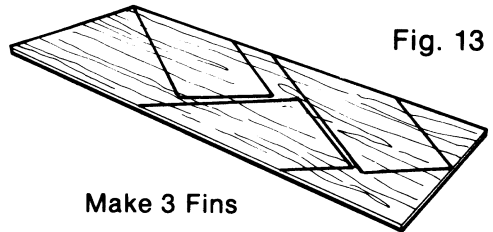
**NOTE:** When the adapter is inserted into the engine mount to fly with 18mm diameter engines (B or C), the last centering ring will stick out of the tube. This is correct, as the ring's only function is to sit against the engine mount's retainer and prevent the adapter from moving.



## GLUE IN THE ENGINE MOUNT

A Smear a wide band of glue around the inside rear of the main body tube, 2cm up inside.

B Slide the engine mount into the main tube until the base of the engine tube is flush with the end of the main body tube (Fig. 12). The end of the engine retainer must hang out the rear of the tube.



## CONSTRUCT THE FINS

A Cut out the fin and fin mount patterns from the pattern sheet.

B Trace the fin pattern onto the thicker balsa sheet using the fin layout shown (Fig. 13). Make sure

that the balsa grain direction is as shown on the pattern.

Trace out 6 sets of fin mount details (6 of each) on the smaller sheet of balsa. Again make sure that the grain direction is as shown on the patterns.

C Carefully cut out each fin and fin mount detail from the balsa sheets using a modelling knife or single edge razor blade. **DO NOT ATTEMPT TO CUT THE Balsa IN A SINGLE STROKE.** When cutting balsa, run the blade lightly along the line to be cut, barely applying pressure on the first stroke. On each stroke afterward, apply more force on the blade. After three or four strokes, the balsa will have a smooth clean cut. Attempting to apply too much force and making the cut in one stroke will usually tear the balsa, giving the fin an unsightly appearance.

D Round the leading edge of each of the fins (as shown in Fig. 14). Leave all other edges of the fins flat and squared off.

Bevel the edges of the fin mount details (as shown in Fig 15). The bevel should be quite pronounced, that is, it should be about 60°.

A set of fin mount details must be made for each side of each fin. Care must be taken, in order to avoid making a mistake when bevelling the details, since it is easy to make them all for one side — leaving none for the other side. It is best to lay out all of the details on a table, so that they are all pointing in the same direction, then take 3 of each type of detail, and flip them over. Bevel the details (as shown in Fig. 15) with a sanding block, on the side laying face up on the table.

E Glue a set of fin mount details to each side of each fin, using the positioning marks on the fin pattern to aid you in placing the details.

F The root edge of the fin, the edge that is attached to the body tube, must be perfectly flat if it is to have a strong glue joint when glued. Set a fin on the edge of a table, then holding the sanding block at right angles (90°) to the fin, sand the fin root very lightly with an up and down motion (Fig. 16). Do this until the root edge is completely flat. Test periodically by placing the root edge on a flat surface (such as a table top) to see if it sits flat. Repeat for the other fins.

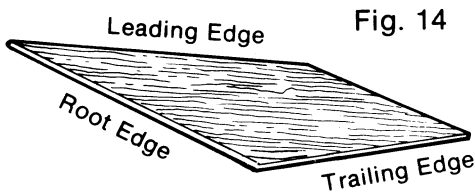


Fig. 14

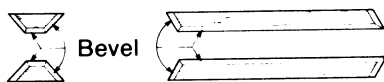


Fig. 15

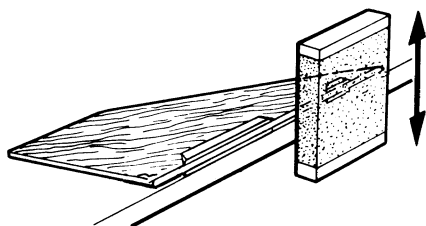


Fig. 16

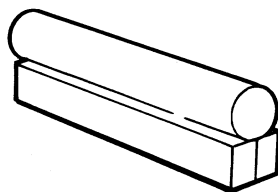
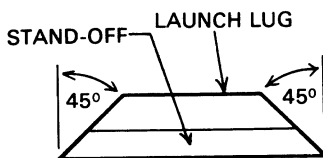


Fig. 17



#### CONSTRUCT THE LAUNCH LUG/ STAND-OFFS

A Carefully cut two small 3mm x 5cm strips of balsa from the remainder of the thicker balsa sheet. Glue the two strips together to make a single 3mm x 3mm x 5cm strip.

B Glue the launch lug to the balsa strip, (as shown in Fig. 17). Once the glue has completely dried, cut the launch lug/stand-off in half. Trim each end of each launch lug/stand-off piece to a 45° angle, (as shown in Fig. 18).

## FINISHING THE Balsa PARTS

Raw balsa is unsightly, coarse and grainy if painted before the grain is "filled" and the surface is "sealed". Model rockets look professional if the time is taken to finish the balsa. The Canaroc Guide to Space Modelling contains tips on finishing and may be consulted for assistance.

- A Butyrate dope is used in the most common method of finishing balsa. You will find it at most hobby outlets. To assist in filling the balsa grain, cornstarch, talc, or baby powder may be rubbed onto the balsa and worked into the grain. Brush a thick coat of dope onto each balsa part. Be sure to do both sides of each fin at once to avoid warping.
- B After the dope has dried completely, lightly sand the balsa surfaces with fine sandpaper. The sanding operation removes the excess thickness of dope and speeds up the process of filling the grain.
- C After repeating the doping/sanding operation three or four times, the balsa grain should be filled and the surfaces smooth. The last sanding operation should be done with extra fine sandpaper.

## MOUNTING THE FINS

- A Cut out the Fin Placement Guide from the pattern sheet.
- B Wrap the Guide around the rear of the body tube (the end with the engine mount), and tape the ends of the guide together.
- C Place a mark on the body tube where each fin position is shown by an arrow on the Guide. These marks will show you where to align the fins when glueing them to the tube (Fig. 19).
- D Place a line of glue along the root edge of a fin (Fig. 20). Place the fin on the rear of the tube along the alignment marks. Set aside until the glue has set. Be sure that the fin is sitting at 90° to the tube when viewed from the end (Fig. 21).

Fig. 19

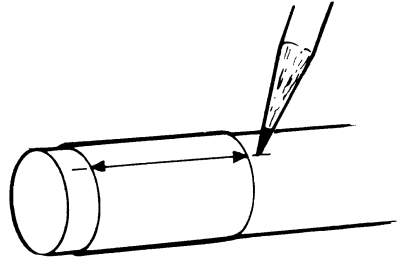


Fig. 20

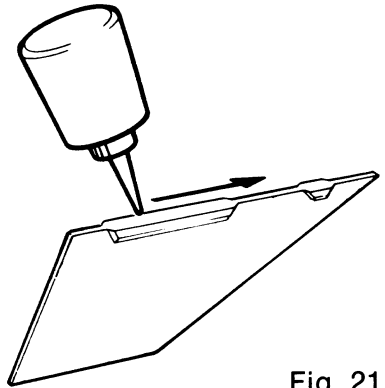
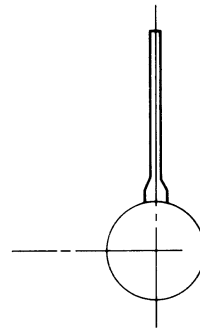


Fig. 21



- E Repeat the procedure to glue on the other fins. All fins should be evenly spaced around the tube when completed.
- F Once all the fins have dried, lay a thin line of glue along each fin joint to form a "fillet" and strengthen the fin. Smooth out the line of glue neatly with the tip of your finger.

## SHOCK CORD MOUNT

- A Cut out the Shock Cord Mount from the pattern sheet.
- B Construct the Mount as shown in Fig. 22. Fold the panels so that the shock cord rolls up with it.
- C Spread glue on the folded side of the Mount and insert it into the front of the body tube at least 5cm inside. Press it firmly against the wall of the tube (Fig. 23).

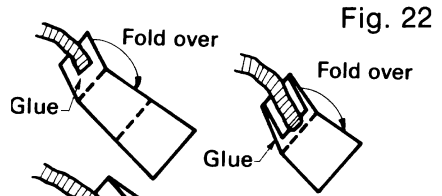


Fig. 22

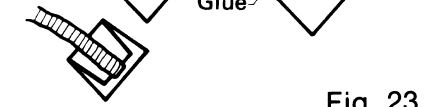


Fig. 23

## MOUNT THE LAUNCH LUG/ STAND-OFFS

- A Slide the Fin Placement Guide back onto the model, just in front of the fins, then align the arrows with the corresponding fins. Mark the body tube along the seam of the Guide.

Lay the model in a drawer sill, with the fins hanging over one side of the drawer (Fig. 24). Run a pencil along the lip of the drawer to extend the mark, all of the way up the tube. By using a drawer sill, you will be sure that the line is straight. Use a ruler to extend the line below the leading edge of the fins. Mark out the following positions on the main body tube, along the line just drawn:

Upper Launch lug  
6.00cm from **top** of tube to  
**top** of lug

Lower Launch Lug  
6.25cm from **bottom** of tube  
to **top** of lug

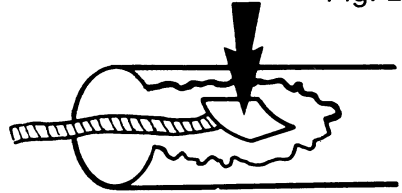
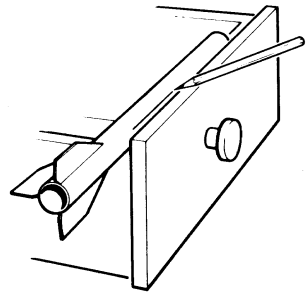


Fig. 24



- B Glue the two launch lug/stand-off pieces in position, using the above markings. Make sure that the lugs are properly aligned by sighting through them, from the bottom of the model.

parts, you will make sure that they will be held permanently in place by the glue).

- B Tie the free end of the shock cord to the eyelet and make a solid knot.

## CONSTRUCTING THE UPPER STAGE

- A Using sandpaper, lightly roughen the shoulders of the nose cone, and the adapter, which fit into the PT-200 tube. Glue the nose cone and adapter into opposite ends of the PT-200 tube. (By roughening the shoulders of the two plastic

## PARACHUTE

- A Construct the parachute as instructed on the pattern.
- B Tie the knotted end of the parachute shroud lines to the eyelet in the base of the adapter.

## PAINTING

A It is best to use spray paints on a scale model, they provide a superior finish and are easier to use than brush-on paints. Krylon spray paint is recommended, since the Krylon colors closely match the actual display colors of the Black Brant IV.

First apply a uniform base coat of gloss white to the entire model. Paint should always be applied in thin coats to speed drying, and to prevent unsightly sags. When spray painting, hold the can about 20 to 30cm from the model and spray in light even strokes. Let each coat dry at least 2 hours before you apply another coat.

B Once the first coat has dried (12 to 24 hours) locate the "White Fin," (it's the fin opposite the launch lugs). Use masking tape to mask off the "White Fin." Plastic wrap, or paper may be used to cover all but the root edges of the fin. Be sure to completely seal off the fin, since subsequent coats of paint can, and will get through any opening.

C Mark the following positions, near the top of the main tube:

2.00 cm from **top** of tube  
to **top** of band

4.60 cm from **top** of tube  
to **bottom** of band

Wrap the Fin Placement Guide around the tube, and use the top edge of the tube Guide to extend the marks around the circumference of the tube. Carefully mask off the section of the tube between the two lines just drawn.

D Seal down the edges of the tape with your fingernail, and give the entire model a coat of gloss cherry red. Depending on the thickness of this coat, you may or may not require an additional coat of paint.

E Give the final coat of paint 1 to 2 hours to dry, then remove the masking tape by slowly peeling it back against itself, being careful not to peel off any paint.

F Allow at least 24 hours for the paint to dry before applying decals.

## DECALS

To make finishing of the model easier, two decal sheets are provided; a clear one with the "decal wrap arounds" on it, and a white one with the model's lettering on it. The white decal allows the "White Stripes", and lettering to be applied at once.

The following markings must be made on the model to aid in placing the decals.

Mark the positions of the lower "White Stripes" as follows, using the Fin Placement Guide. Wrap the Guide around the body tube, just above the fins, and tape the ends of the Guide together. Align the Guide so that the arrows match up with the proper fins, and then mark out both White Stripes.

Lay the model in a drawer sill, with the fins hanging out over one side of the drawer. Run a pencil along the lip of the drawer to extend the markings made for the white stripes all the way up the tube. The lines must be extended to the bottom of the tube using a ruler.

Using the dimensions listed below, mark off the ends of each stripe.

Top of White Stripe:

4.60 cm from **top** of tube

Bottom of White Stripe:

5.10 cm from **bottom** of tube

There is a mark on the Fin Placement Guide, which is used to centre the Circular Cover on the tube. The Guide must be properly aligned with respect to the white stripes and the fins, and a mark should be made on the tube about 4cm from the top. That mark corresponds to the centre of the Circular Cover.

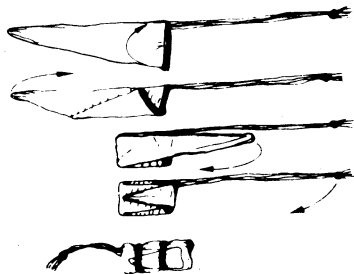
The lower decal wrap-around is positioned (see below) over the white band on the main tube, in such a way that the bottom line of the wrap-around is aligned with the bottom of the band.

Cut out the Decal Placement Guide, and use it, and the following measurements, to mark the positions of the upper stage decals, as you did above.

Top of (Upper) White Stripe  
4.05cm from **top** of tube

Bottom of (Upper) White Stripe  
0.30 cm from **bottom** of tube

Bottom line of (Upper)  
Decal Wrap-Around  
4.05 cm from **top** of tube



To apply the decals see instructions on back of decal.

Follow the same procedure to apply all of the decals.

## FLYING

A Install the engine by sliding it into the engine tube until it is locked firmly between the two ends of the engine retainer. If the model is to be flown with 18mm diameter engines (B or C), then the engine adapter must be slid into the engine mount first.

B Push a piece of heat wadding down into the top of the tube. The wadding serves to protect the plastic parachute from melting due to the hot gases of the engine's ejection charge. There should be a 2 to 3 cm thickness of wadding to create a good piston between the parachute and the engine.

C Fold the parachute in the following manner:

- hold the tip of the parachute with one hand and the shroud lines with the other.
- gather together all of the free corners so that the parachute forms a triangle.
- fold over the corners
- fold over the parachute into thirds
- wrap shroud lines around the bundle.

- D Insert the parachute into the tube. Push in the shock cord and remaining shroud lines, then slide on the nose cone.
- E Install an igniter into the engine according to the instructions provided with the engine.
- F Slide the rocket onto the launch rod, sliding the rod through the launch lug. This will guide the rocket at the moment of launch.
- G Attach the igniter clips to the leads of the igniter.
- H Insert the safety key into your launch controller, give a 5 second countdown and press the button to launch your model.

For further tips see Canaroc's  
GUIDE TO SPACEMODELLING.

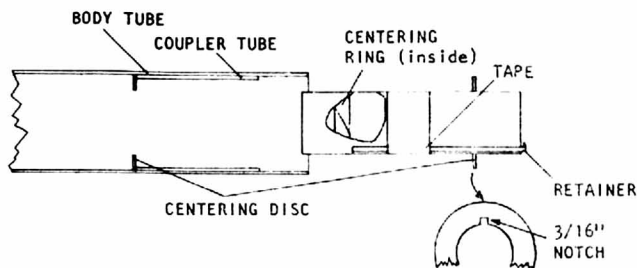
**CANAROC**



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IRWIN TOY LTD.  
43 Hanna Avenue  
Toronto, Canada  
M6K 1X6



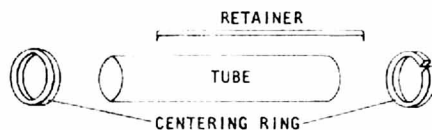
## CONSTRUCTING ENGINE MOUNT



- Make a vertical cut in the coupler tube. Squeeze the tube and insert it into one end of the main tube (PT-400). Draw a line along the inside of the coupler where it overlaps. Take out the coupler and cut it along that line. When re-inserted the two ends should meet, and the coupler fit tightly in the tube. Remove the coupler.
- Take the large engine tube (PT-200) and cut a slit 2-3/4" from one end. Place a spot of glue on the slit and insert one end of an engine retainer into it. Wrap a strip of masking tape around the tube and retainer about 1 1/2" from the end of the tube. Spread glue around the inside of the forward end of the engine tube (just in front of the retainer) and slip one of the centering rings into place till it rests against the retainer. This acts as an engine block.
- Place a line of glue on one side of a centering disk along the outer edge. Place a line of glue around the inside of the main tube 3" from the rear. Slide the centering disk into the tube till it is in the glue. Smear glue around the outside of the coupler and slide it into the main tube till it meets the centering disk.
- Cut a 3/16" square notch in the other centering disk. Spread glue around the engine tube 1" from the rear, and slide the centering disk onto the glue. The notch should be positioned over the engine retainer.

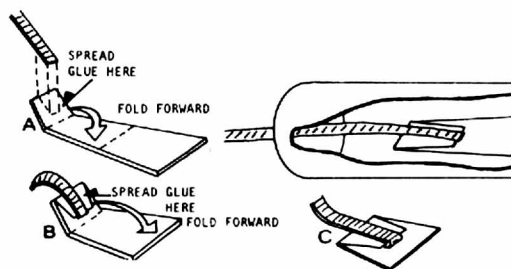
E. Place a line of glue around the inside of the tube 3/4" from the rear (immediately in front of coupler), and around the front of the centering ring around the outside engine tube 3/4" from the end. Now fit engine holder assembly into the coupler inside the tube so that all parts fit

## 18 mm. ENGINE ADAPTER



Cut a slit 2 1/2" from the end of the small engine tube (PT-100). Place a spot of glue on the slit and insert one end of an engine retainer into it. Wrap a strip of masking tape around the tube and retainer in the middle of the tube.

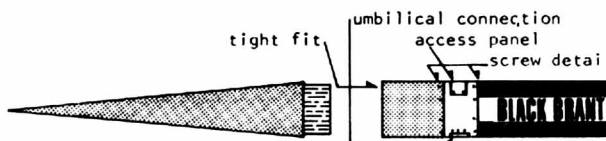
Cut a 3/16" notch from a centering ring. Spread glue around the rear of the adapter and slide the centering ring into the tube so that the notch is positioned over the retainer. Spread glue around the other end and slide the centering ring onto the tube.



Assemble the shock cord mount as shown.

## PAINTING

- The entire rocket should be given an undercoat of glossy white. Another coat may be added to thoroughly cover all parts of the rocket. Set aside the model to dry thoroughly. NOTE: It is best to let the model sit over night before masking if a laquerized enamel is used. If regular enamel is used, it should be left several days.
- Mark off where the stripes go in reference to the fins from the fin marking guide. Extend the lines to either end of the tube.
- Mask off the stripes... The stripes must be masked off extremely accurately, because the lettering decals must fit perfectly inside them.
- Mask off the fin indicated on the marking guide as "WHITE FIN".
- Run your thumbnail down all masking tape edges to be sure they are sealed.
- Paint the entire rocket and nose cone a glossy cherry red. When the paint is dry, run the blade of a modeling knife lightly along all the masking tape edges. Remove the tape by peeling it back against itself.
- Decals may now be added. To apply, first trim them down to the desired size, peel back the protective backing and press them down in the proper position.



## STRIPES

Stripe sizes and locations may be found from the marking guide (top stage) and the fin marking guide (lower stage).

## DECALS

Trim the excess material from around each decal (including details), lift them from the backing with a sharp knife, and apply them to the positions shown.

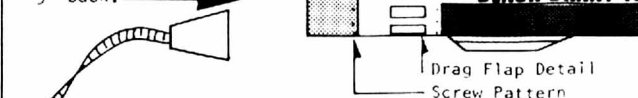
## TOP STAGE

BLACK BRANT IV  
Screw Detail  
Screw Detail  
Top of Stripe  
Bottom of Stripe

Bristol aerospace limited 11 00" (

Screw Detail  
Screw Detail  
Igniter Access  
Door  
Umbilical  
Connection

Glue inside tube at least 3" back.



**FIN CONSTRUCTION**

- A. Cut out the fin pattern and trace three of them on the balsa. Be careful that the grain direction is as marked. Cut out each of the fins carefully with a modeling knife or razor blade.
- B. Cut out the fin mount detailing and trace six of each on the thin balsa material. Carefully cut them out and glue to the position shown on the fin pattern on both sides of each fin.

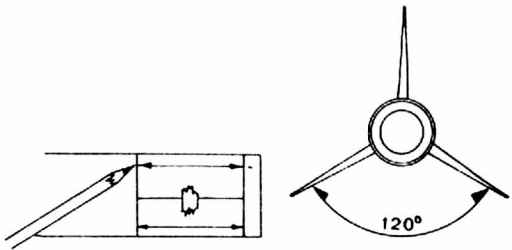


**LAUNCH LUGS**

Cut out the lug standoffs from the thick balsa material and shape as shown. Cut the launch lugs in half and then to the shape shown. Glue the launch lugs to their standoffs. The lugs are glued to the tube at the position shown on the blueprint drawing. Take care that they are properly in line by sighting them through each other.

**SEALING Balsa PARTS**

Apply a coat of sanding sealer to the fins. Both sides should be done at once, then propped on its side to avoid warping. When thoroughly dry, sand lightly with fine sandpaper, then apply another coat of sealer. Repeat this, sanding between steps with extra fine sandpaper until a smooth glossy surface is attained. Repeat this procedure for all other balsa parts.



**FIN PLACEMENT**

- A. Cut out the fin marking guide and wrap it around the rear of the body. Mark the tube at each arrow indicated "FIN!" Connect and extend the lines.
- B. One by one, glue the fins to the body tube. This is done by placing a thin film of glue along the root edge of the fin and positioning it along the lines made. Check to be sure the fin is aligned properly. When the fins are dry, place a thin line of glue along each joint to form a fillet and strengthen them.

**CUTTING THE TUBES**

The large body tube must be cut to a length of 21.4". Do this by wrapping a straight strip of paper around the tube .6" from one end and marking a pencil line around it. The tube is then carefully cut with a modeling knife or single edge razor blade. It should take several attempts to cut completely, with the first being light and getting harder with each consecutive cut.

**SAND THE TUBES**

Prepare the body tubes by sanding smooth with extra fine sandpaper.

ls

Screw Patterns

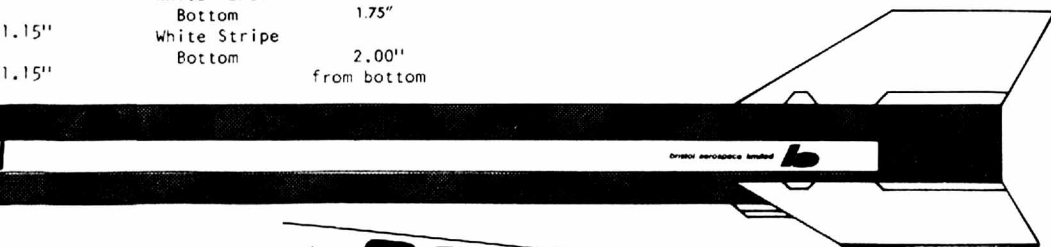
Tight Fit

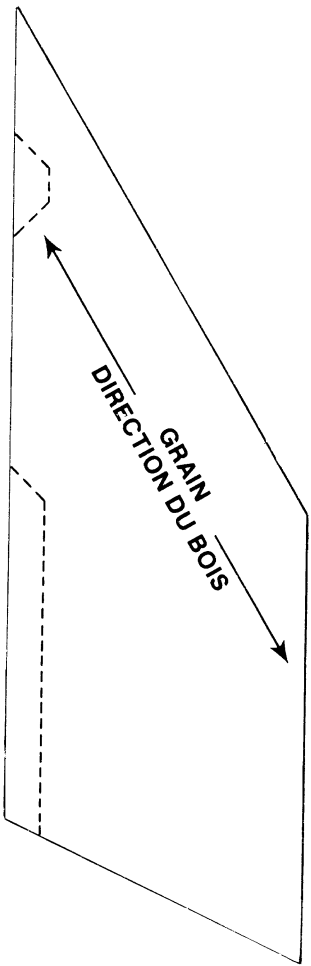
Screw in the screw eye into the conical shoulder. Unscrew it, squirt glue into the hole, then replace the screw eye.

BOTTOM STAGE		
1.9"	BLACK BRANT IV	2.15"
1.0"	bristol aero-	
1.5"	space limited	16.00"
1.52"	Ignitor Access	at very
	Door	top of tube
.19"	(location shown on marking guide)	
from base)	White Panel	
at very	Top	.76"
e of tube	White Panel	
	Bottom	1.75"
1.15"	White Stripe	
	Bottom	2.00"
1.15"		from bottom

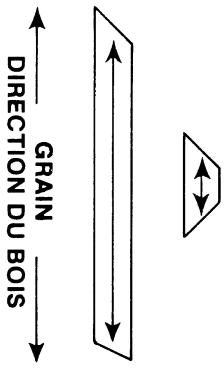
(all measurements from the top of the tube to the top of the detail)

Knot shroud lines and shock cord to screw eye.

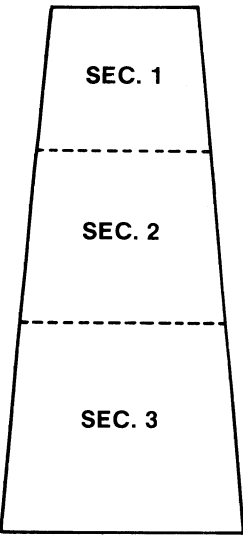




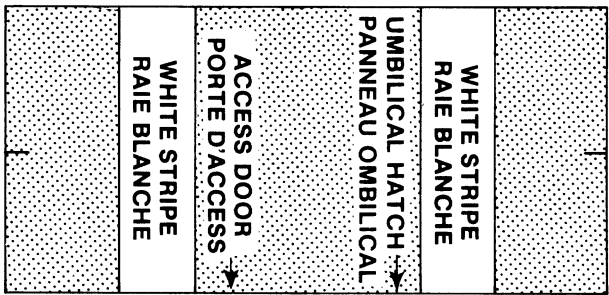
**FIN MOUNT DETAILS  
DETAILS DU MONTAGE D'AILLETTE**



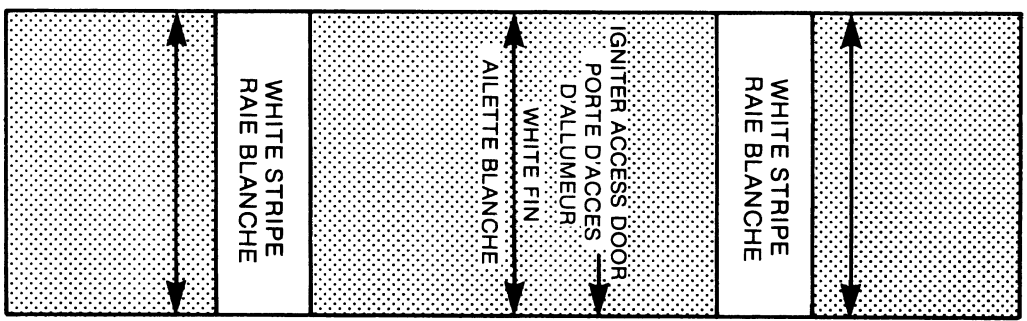
**SHOCK CORD MOUNT  
MONTAGE DU CORDON AMORTISSEUR**



**DECAL PLACEMENT GUIDE  
GUIDE DE REPERAGE DE DECALQUES**



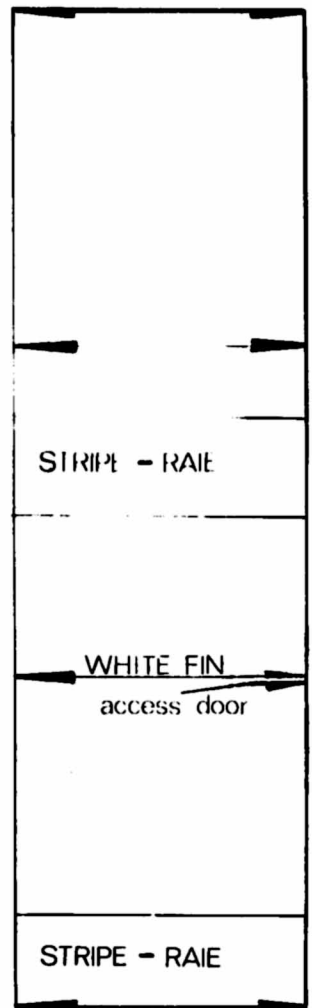
**FIN PLACEMENT GUIDE  
GUIDE DE REPERAGE DE L'EMPENNAGE**



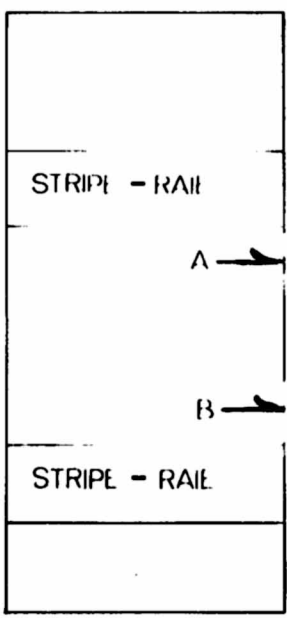
**BLACK BRANT IV #54003  
PATTERN SHEET  
FEUILLE DE MODELE**

FIN MARKING GUIDE

GUIDE DE MARQUAGES

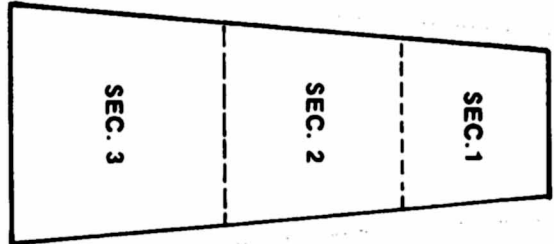


STRIPE MARKING GUIDE

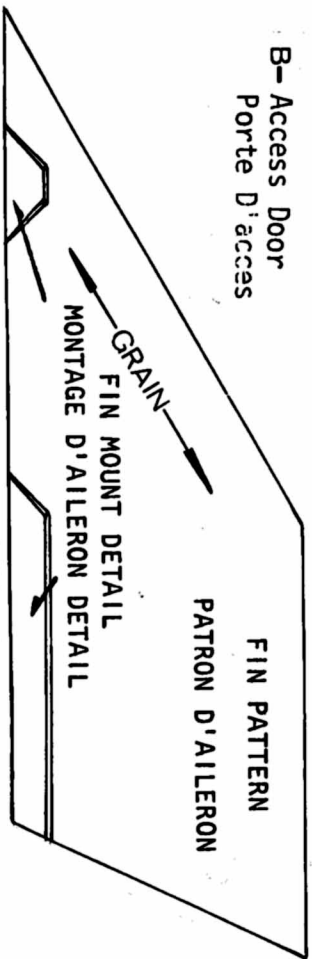


A- Umbilical Hatch  
Hublot Ombilical

B- Access Door  
Porte D'accès



SHOCK CORD MOUNT  
CORDON-AMORTISSEUR



**BLACK BRANT IV**

*bristol aerospace limited*

