

QUASAR

The Quasar booster has been developed to fill a gap in model rocketry that has existed since cluster techniques became prominent; there was simply no truly high performance kit available that had the necessary versatility and lift for sending medium payloads to high altitudes. The Quasar starts out with a cluster of four engines (other kits start off with three engines) and ejects three of them after burnout while the core engine continues burning. Thus, a great deal of drag and weight is eliminated the instant the outboard engines are spent. Certain special combinations of engines have been found to be most beneficial; see the chart at the end of the instructions for details.

In order to construct the Quasar, you will need the following tools: a sharpened pencil, scissors, sharp hobby knife, steel ruler, scotch tape, fine and very fine sandpaper, modeling cement or white glue and a hole punch if it is available. The Quasar is a complex, advanced missile that must be built with care so follow the instructions carefully.

Step 1. Identify the parts:

1. one 12" body tube (airframe)
2. three 4" body tubes (for pods)
3. one 3½" birch nose cone
4. three balsa nose cones
5. one 12" piece of shock cord

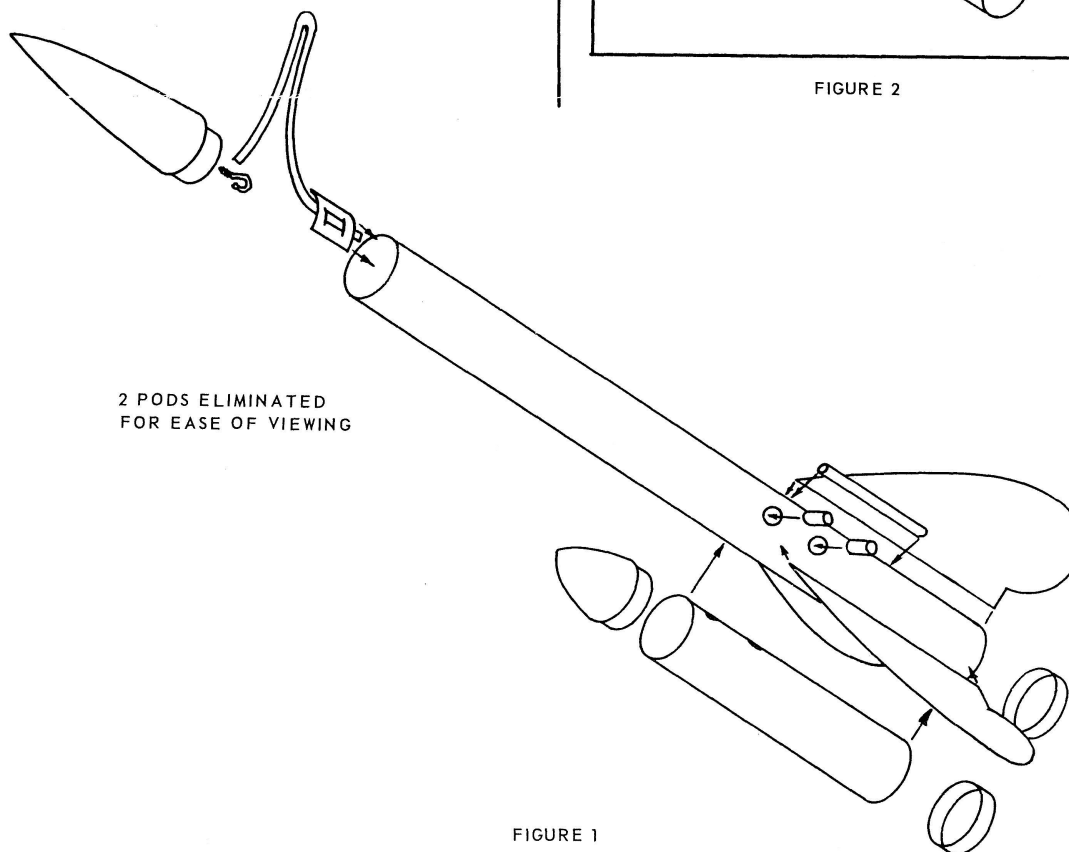


FIGURE 1

6. one screw eye
7. three sheets of 3" by 5" balsa
8. fin and hole pattern sheet
9. four black engine blocks
10. engine spacer
11. six ¼" dowels
12. 2" launch lug

Step 2. Cut out the full size fin pattern and lay on the balsa as shown on the sheet. Cut out these fins and round all edges except the gluing edge. Apply a coat of glue on this edge and set them aside to dry.

Step 3. Cut out hole pattern sheet and cut out circles (use hole punch, if available) and fin location slots as directed. Wrap the pattern around the tube and tape the sheet so the bottom is flush (even) with one end of the 12" tube. See Figure 2. **This is the most important step - the holes must be well aligned or your rocket will not fly correctly.**

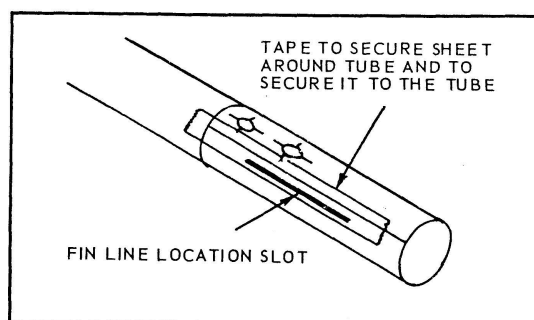


FIGURE 2

Step 4. Trace the circles and fin slots onto the body tube and continue the center lines across the circles as shown in Figure 3.

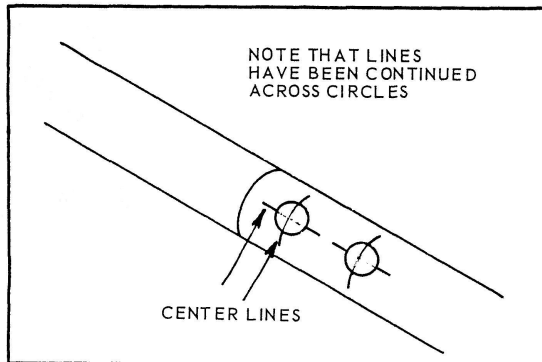


FIGURE 3

Step 5. Remove the hole pattern sheet from around the tube and cut the lines in the circles so that there are a pair of cuts crossing each other inside each circle; be sure that you do not cut beyond the circles.

Step 6. Poke your pencil through the intersection of the two cuts so that a hole is made in the body tube that is the same size as the one you originally drew on the tube. Do this for all 6 holes.

Step 7. Apply a coat of glue to the inside of these holes and let it dry. Continue the line made from the fin location slots so that the line extends from the height of the top circle to the bottom of the body tube. Do this for all three lines. Apply a narrow coat of glue along these three lines and set the body aside to dry.

Step 8. Slip the hole pattern sheet around each one of the three pod tubes so that the end nearest the holes is flush with one end of the small tube. Trace the holes as you did before and continue the center lines as done previously. If you have a hole punch available, use it to make the hole closest to the end of the tube; if you have no hole punch, take extra care in making this hole as one slip with the knife could rip the tube. If the tube is cut when the engine spacer is inside, the chances of ripping the tube are reduced. Follow the same procedure (step 6) for making the holes, but be sure the hole are roughly circular so that they will fit over the dowels easily. **Make only one pair of holes in each pod!**

Step 9. Apply a coat of glue to the dowels near the ends and another coat of glue to the inside of holes in the airframe tube. Force each dowel into a hole carefully so that about $\frac{1}{4}$ " protrudes from the tube. Each pair of emplaced dowels should be carefully aligned so that the pods will be well aligned when attached. See figure 4.

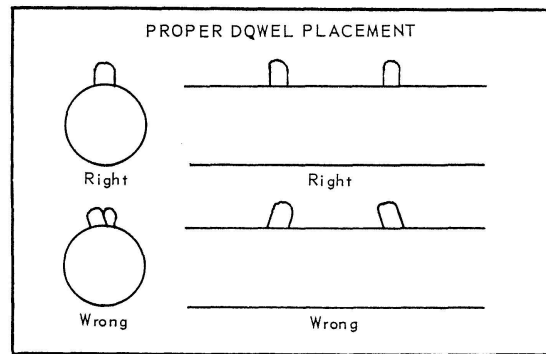


FIGURE 4

Step 10. When the dowels are completely dry (allow at least one hour between steps 9 and 10) try fitting each pod to a pair of dowels. You will probably find that each pod will fit a particular pair of dowels rather than all three sets, so it is suggested that you match each pair of dowels with the best fitting pod by numbering the dowel pairs 1, 2, and 3, correspondingly. When the best fitting combinations have been found, it is suggested that the flat ends of the dowels be rounded slightly to reduce air drag. When this step is completed, check the alignment of the pods. If any are even slightly out of line (that is, if any pod is pointing to one side slightly), adjust the holes in the pods so that the pods are parallel to the airframe tube. This step is very important — if the pods are not properly aligned, the rocket will spin and fly out of control. You may adjust the holes by slightly enlarging them on one side or making them longer. Any such changes in shape however, should be corrected by building up a layer of glue to take the place of the displaced body tube. When you have achieved the proper alignment, coat the inside of the holes with another coat of glue to strengthen the body tube. Set the pods aside to dry.

Step 11. While the pods are drying, apply a coat of glue to the inside of the center tube just below the lower dowels and emplace one black engine block. This may be done by coating one end of a 3" piece of scrap balsa with glue and using it to apply glue inside the tube. Use the engine spacer ($2\frac{3}{4}$ " cardboard tube) to push the engine block into place. Be sure to remove the spacer immediately so that it is not held in the tube by any stray glue.

Step 12. Locate the screw eye and screw it into the base of the large nose cone. It is easiest to screw the eye when a small hole has been made in the base of the cone. This may be done by using the tip of your modeling knife. When this has been accomplished, tie the shock cord tightly to the screw eye. Cut out the shock cord attachment sheet (from the hole pattern sheet) and apply a coat of glue to the areas indicated. Thread the shock cord through the small rectangular holes that should be made in the attachment sheet and glue the cord directly to the paper. After letting this assembly dry for about 10 minutes, apply a coat of glue to the top end of the 12" body tube between 1" and 2" from the top.

Slip the attachment sheet (with shock cord attached) into the tube and glue it in the above detailed region. See figure 5. Set the 12" tube aside to dry.

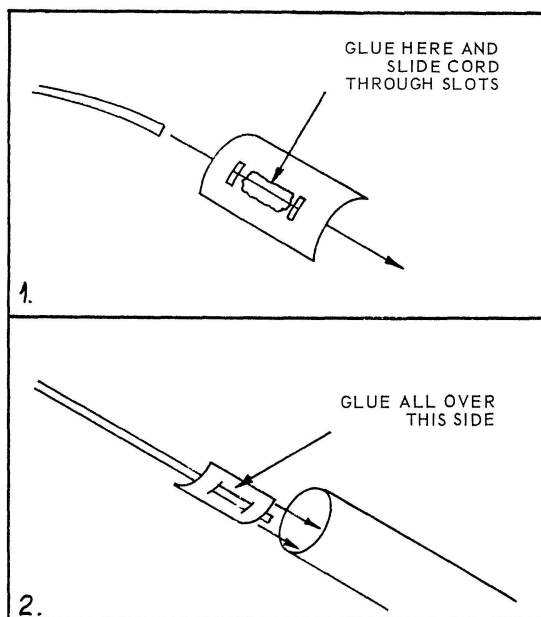


FIGURE 5

Step 13. If the pod holes are dry, attach a black engine block in each pod by following the same procedure detailed in Step 11. Be sure the engine block does not block the lower hole; remember that the block fits below the lower hole, **not** between holes or just below the nose cone. The engine spacer should be even (flush) with the end of the main airframe tube when the pod is attached. Be sure to remove the engine spacer from the pods so that it is not accidentally glued inside any tube.

Step 14. Spread glue around the top $\frac{1}{4}$ " of each pod tube and emplace each balsa nose cone. Glue them in well so they are not loosened by the engine's ejection charge or the shock of landing. Set the pod assemblies aside to dry.

Step 15. When all parts of the central tube assembly are dry, attach one fin along the lines drawn in Step 7. Be sure the fins follow these lines and are aligned with the tube so as to cause **no** spin. When each fin attachment is dry, the next fin may be added with checks on spacing between additions of fins. Spacing may be checked by comparing the fin placement with figure 6. Attach each fin individually and allow about 20 minutes between successive attachments.

Step 16. When the fins are dry, glue the launching lug at a joint between a fin and the tube. Apply a fillet at the root edges of all fins. Set aside to dry.

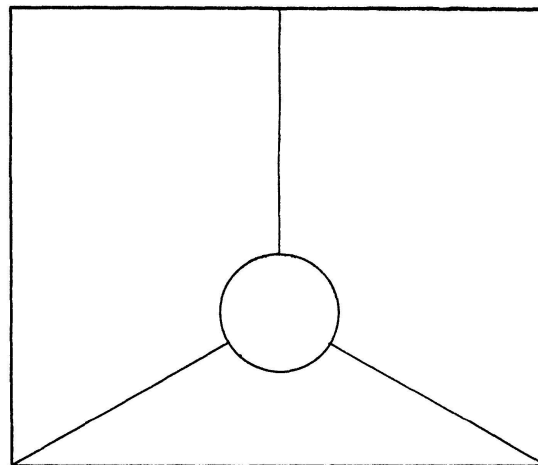


FIGURE 6

Step 17. To increase performance and visibility (important when trying to find those pods), it is suggested that at least two coats of sanding sealer be applied to the entire rocket, sanding between coats. Spray with a bright or fluorescent orange, red-orange or cerise paint for best results. Be sure to remove any paint from the dowels since added thickness may cause friction between dowels and pods.

Further Notes. The Quasar is made to be extremely versatile and has many applications as a booster. There are several precautions that must be taken when flying the Quasar, however. The most important preparation for flight is emplacing the igniters. We recommend the following procedure:

1. Cut your igniters the same length — do **not** use Jetex fuse igniters — and make any loops identical in each igniter.
2. If available, use a set of ignition leads for each igniter; that is, you will need four pairs of igniter clips — such a set of clips for use in cluster ignition is available from Rocket Supply for \$1.95 under the name of Clust-R-Clips (see hole pattern sheet).
3. Attach all clips nearest to the middle of the igniter.
4. Just prior to firing, check all igniters to be sure they are held firmly in the engine's nozzles and be sure that no clips are touching each other or any metal.
5. Use only a fully charged 12 volt car battery for power to insure instant ignition.

We have found that one of the best methods for igniting a cluster is the use of the Ignitrite igniters, also available from Rocket Supply. The combined use of Clust-R-Clips and Ignitrites will insure simultaneous ignition and thus save on engines wasted in faulty ignition.

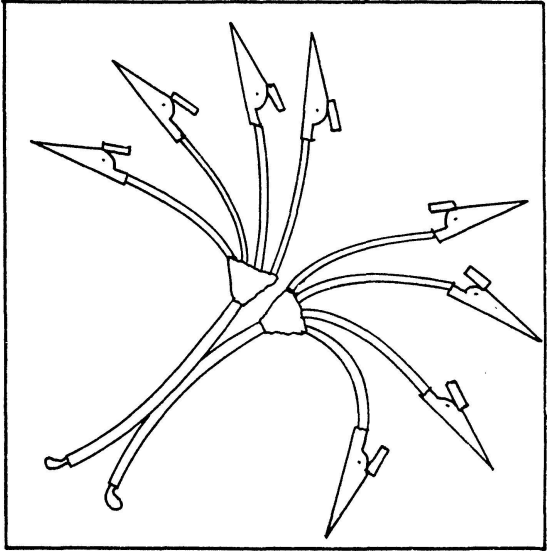
Following is a table of suggested engine combinations for various purposes.

Purpose	Inboard	Outboard
low G, large pld., low alt.	1/2A-8-2	1/4A-8-0
low G, large pld., high alt.	B-8-6	C-8-0
medium G, large pld., low alt.	B-3-5	1/4A-8-0
high G, large pld., high alt.	B-3-5	B-3-0

For altitudes between the first two categories, use A-8-4 and 1/2A, A, or B boosters. An upper stage may be added as long as the upper stage engine is primed with a short length of Jetex Fuse (1'') to insure second stage ignition.

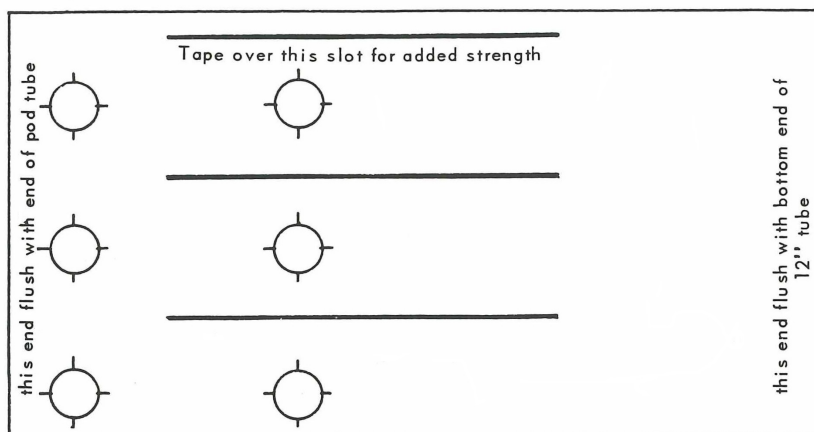
When using all Series II engines, be sure that the dowels are well secured and any payload section is well constructed to withstand great stresses.

Please drop us a note on what you're doing with your Quasar as we are always interested in new ideas and applications. Good Luck and Good Flying!



CLUST-R-CLIPS

FIN LOCATION AND HOLE PATTERN SHEET FOR QUASAR

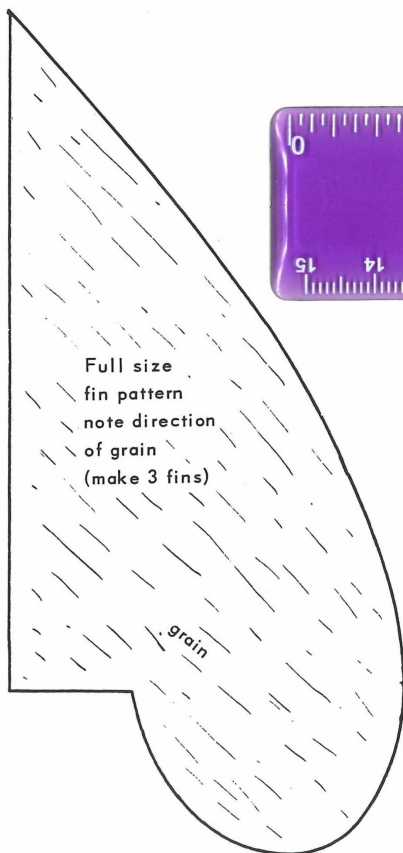
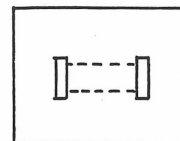


fin and hole Pattern sheet – cut out circles and fin line location slots accurately – use steel ruler to cut all straight lines accurately.



reduced sketch at left shows proper placement of pattern on balsa wood.

shock cord attachment sheet – cut on all solid lines – glue inside all dotted lines on this side and slide shock cord through slots.



Full size
fin pattern
note direction
of grain
(make 3 fins)



SPECIAL CLUST-R-CLIPS DISCOUNT ORDER FORM

THIS FORM ENTITLES THE OWNER OF THIS QUASAR TO ORDER ONE SET OF CLUST-R-CLIPS FOR 25% OFF THE REGULAR PRICE. ENCLOSED IS \$1.50.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

