Issue 661 / September 23rd, 2025

PEAK OF FLIGHT NEWSLETTER

Apogee Components, Inc. / ApogeeRockets.com / Colorado Springs, CO

Build the Lockheed Lancer Plan



PEAK OF FLIGHT NEWSLETTER

Issue 661 / September 23rd, 2025

COVER PHOTO



The Lockheed Lancer

A futuristic design that is designed to turn heads on the launch field.

FEATURED ARTICLES



Free Plan - Build the Lockheed Lancer

by Robert George

Inspired by the Interceptor design, this rocket uses heavy wall tubes to give extra durability.

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About this Newsletter

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Layout Design: Tim Van Milligan

Ashley Van Milligan in Serbia at the World Space Modeling Championships. Click here to see the results and lessons learned from the contest in our YouTube video.



https://youtu.be/lfCJX2oywnc

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Build the Lockheed Lancer Plan

By Robert George

Note: You can download the decals, templates, RockSim file, and the 3D-Printer STL files for this plan at:
https://www.apogeerockets.com/Peak-of-Flight-Rocket-Plans

The Lockheed Lancer was conceived to use the latest in cloaking technology to enable it to penetrate fringe areas of the galaxy and gather intelligence information without being detected. The colors and markings on my model replicate one of the operational Lancers. It is unknown how many were manufactured. It was often paired with the Estes Interceptor in hunter/killer operations during the 2050s.

Construction:

Let's start with the laundry shelf. No one makes these, so take the bulkhead from the list and modify it as shown in Figure 3.

The tape is there to help stop splintering. It is also helpful to press the bulkhead against a 2x4 when you drill the 0.375" (10 mm) perimeter holes and the 0.25" (6 mm) center hole.

Once it is ready, you can epoxy it into the middle of the coupler. I like to use some epoxy, slightly thinned with isopropyl alcohol, to coat both sides of the wood. Next, install the screw eye. I use a

Apogee P/N	Description	Quantity
10063	AT-13/18 (6 pk) – Optional for ECM Pods	1 (if not printed)
11010	54mm LOC Body Tube	1
10251	29mmx34" Thick-Wall Tube	1
12262	54mm Coupler Bulkhead Disk	1
13060	13060 Standard Rail Buttons	1
13158	2.14" (54mm) LOC Coupler	1
13409	Centering Ring 29mm (Thick-Wall) to 54mm	2
20113	PNC-2.14" (54mm)	1
24020	29mm Estes Retainer	1
29094	30" Printed Nylon Parachute	1
29629	Eyebolts with Washers and Nuts	1
29507	750# Kevlar Shock Cord	15
	1/8" Plywood for fins	
	3D printed parts: Canopy and cloaking (ECM) pod parts	



Figure 1: Generated image of the Lockheed Lancer taking off in the desert.



Figure 2 - Rendering of the completed plan.

lock nut on the bottom, but some JB weld or Loctite will keep the nut from getting loose.

Now is the time to cut some body tubes. You can use a new, single-edge razor blade, but LOC tubes are tough. I used a razor blade for the initial cut, then switched to a razor saw to make it through. You will need a piece 14 inches (356 mm) long for the upper tube and a piece 16.5 inches (419 mm) long for the lower tube.

Now you need to slot the lower body tube. Use the template to mark the body tube for the fins and the rail buttons. The slots are 3.5 (89 mm) inches long and begin 0.5 inches (13 mm) from the end of the body tube. This cardboard is tough, and you'll probably need a new blade for each fin slot; be careful. I use a razor blade for the long cuts and an X-acto knife for the ends. Once the slots are cut, test-fit the fins and glue them into place using a fin

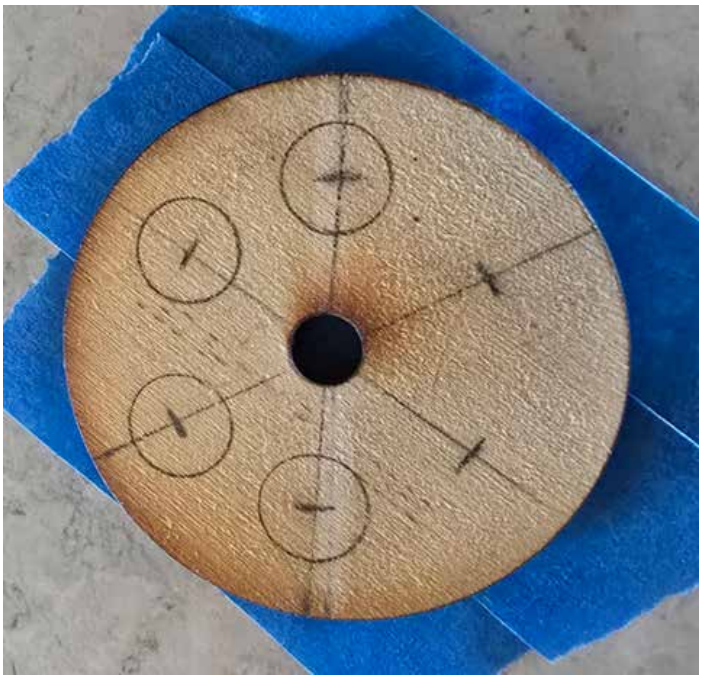


Figure 3 - Layout the drill positions on the bulkhead







Figure 4: Drill out the holes in the bulkhead.

alignment guide. Don't forget the top fin goes directly opposite the rail buttons.

This design uses three rings on the motor mount, as shown in Figure 5. Cut an 8 inch (203 mm) long piece of the 29mm tubing to begin the mount.

I have a sequence I use for gluing the assembly together. First, I glue the middle centering ring to the motor tube. Then I wrap several layers of blue tape around the motor tube just behind the location of the forward centering ring (Figure 6).

The forward centering ring needs to slip over the motor tube and inside the body tube easily for this next step. Once the center ring is dry, slide the forward centering ring over the motor tube. Then smear a ring of glue inside the body tube, 7 inches (178 mm) from the end.

Now, use the motor tube to push the forward centering ring into the body tube until the aft end of the motor tube is even with the aft

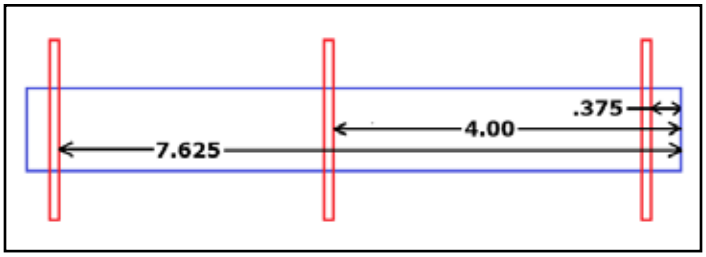


Figure 5 - Centering ring locations are measured from the back of the motor mount tube.



Figure 6 - Wrap tape around the motor mount tube to insert the forward centering ring.

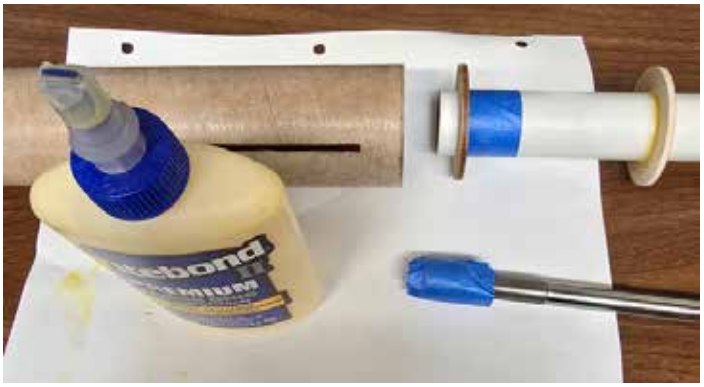


Figure 7 - Use the tape on the motor tube to slide the forward centering ring into position.

end of the body tube. Then, set the tube on a flat surface for a few minutes to give the glue a chance to grab.

Next, remove the motor mount assembly from the body tube

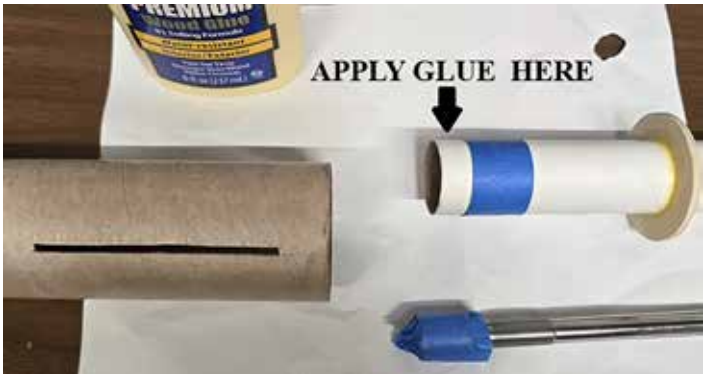


Figure 8 - Pull the motor tube out so that the glue on the forward centering ring can dry.



and remove the blue tape (Figure 8). Smear a ring of glue around the inside of the body tube 3 inches (76 mm) from the end and apply glue around the forward outside of the motor tube. Re-insert the assembly until the aft ends are even. Stand the body tube on the end again and let it dry.

While that's drying, let's make some fins. Start by cutting out three fins as shown in the drawing. I was able to cut mine out of a 12-inch (305 mm) square piece of 1/8" plywood.



Figure 9 - Layout of the fins on plywood ready to cut.

Once they are cut out, stack them and sand them until they match. Then take one fin and sand the tip to match the drawing of the top fin. While you're cutting and sanding, don't forget the horizontal tail fins. This is also a great time to mark the top fin with



Figure 10 - Sand the tip edge and also mark the top fin for the location of the horizontal tip tail fin.



the location for the horizontal tail (Figure 10).

Let's go over the cloaking pods now. You can print them in two pieces, or you can build them from Estes BT-5(AT-13) tubes and nose cones. The built-up pods are lighter but do require a bit more work.

The tube on the built-up pods is 3.25 inches (83 mm) long, and you'll need to cut a 1/8" (3 mm) slot for the fin to slide into. You'll also need to trim the shoulders off the nose cones so they are 0.25 inches (6 mm) long and epoxy them to the body tubes. If you printed the pods, epoxy the pieces together. Once the pods are dry, you can glue them to the "side" fins. Apply a thin bead of glue to the fin tip, slide the pod over the fin, and hold in place with tape until the glue dries. Once dry, remove the tape and make a fillet of glue where the pod body meets the fin. Elmer's is fine for the built-up pods, but use epoxy for printed pods.

The next step is to install the lower rail button. Measure 1 inch from the end of the body tube a drill a hole for the blind nut. Apply epoxy to the flange, being careful not to get any in the threads.

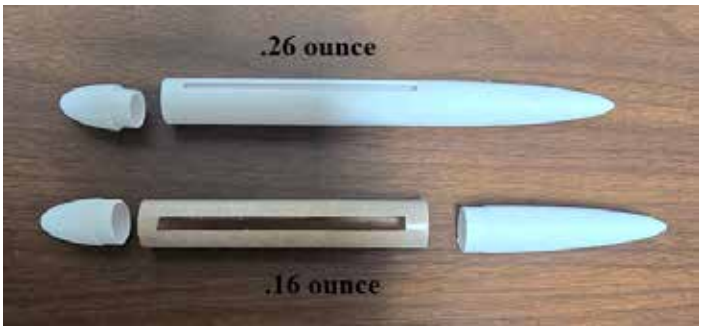


Figure 11 - Two options for pods: fully printed or built-up. Built-up pods are lighter, but the printed pods are less work overall.

Hold the nut in place using the rail button and screw.

Now you can install the aft centering ring. Apply glue to the inside of the body tube, around the motor tube, and to the back side of the fins. Push the centering ring in place and wipe off any excess glue from the motor tube. It needs to be "glue-free" so you get a good bond when you install the motor retainer, which you can do now. Many people use JB Weld for this. I think the biggest thing is to scuff up the inside of the retainer for better glue adhesion.

It is time to install the upper rail button, so drill a hole 13 inches (330 mm) from the aft of the body tube. Just like before, carefully apply some epoxy to the flange of the nut and use the rail button and screw to hold it in place while the epoxy cures.

The back half is done now, and you can glue in the coupler. I use a thin coat of epoxy, but you can use Elmer's. Mark the halfway point on the coupler and be sure to keep the part moving while you twist and push it in place so it doesn't lock up. That's not an issue with epoxy. Now glue the upper body tube onto the coupler.

It's cockpit time now, and I started with the rear part. Extend a line from the center of the upper fin to the front of the body tube. Sand the printed part to fit, making sure you scuff the bottom matting surface. Use the line to center the aft canopy and tape it in place to fit the forward canopy.

Before you fit the forward canopy, you need to prep the nose cone. Mine needed a lot of sanding, and that is best done before adding the canopy. Once you are happy with the nose cone, test fit the forward canopy and sand as needed, making sure to scuff up the mating surface for good glue adhesion. Glue the locating pin into the forward canopy with 0.25 inch (6 mm) protruding aft. Test fit the nose cone/forward canopy to the body tube/rear canopy and adjust as needed.

The next step is to glue on the forward and aft canopies. This is a job for epoxy, and there are special epoxies for plastics, but they are specific to the plastic you are gluing. I used 30-minute epoxy on mine.

I suggest using some tape to hold the nose cone to the body tube. Also, have the rear canopy taped in place for this next step. Then mix up a small amount of epoxy and apply it to the mating surfaces on the bottom of the forward canopy. Put the canopy in place, wipe away any excess epoxy, and tape it to the nose cone.

Next, remove the rear canopy, apply epoxy to the mating surface, and put it in place on the body tube. Wipe away excess



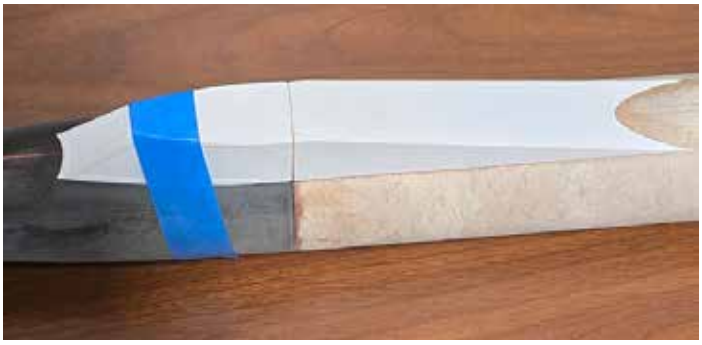


Figure 12 - Gluing the 3D printed canopy sections into place on the nose cone and body tube.

epoxy and tape. Carefully remove the tape holding the nose cone to the body tube and separate. Again, remove excess epoxy and set them aside to cure.

Once the epoxy is cured, tape off the nosecone, body tube, and canopy parts as shown in Figure 13. The tape is about 1/8" (3 mm) away from the joint.

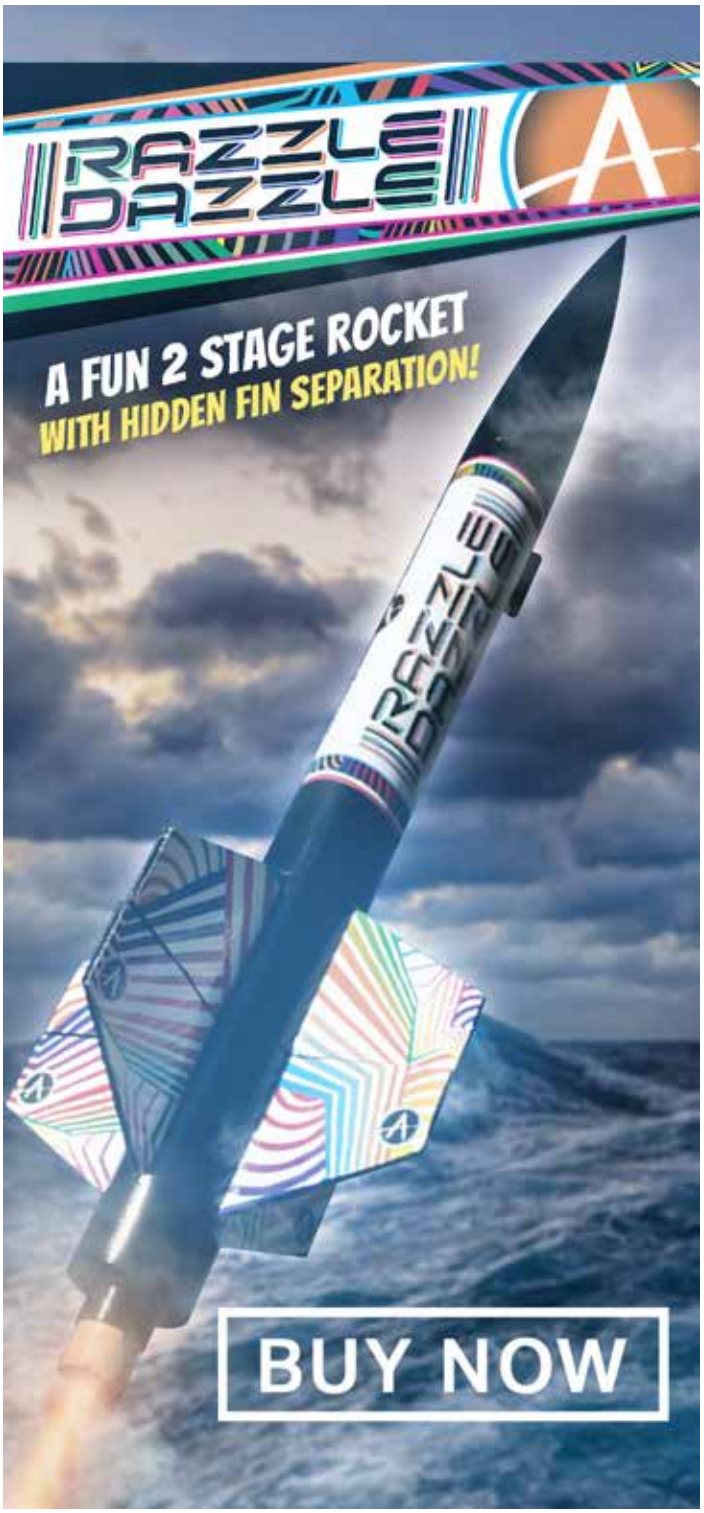
Use a new blade and cut the tape at the canopy seam. Separate the nose cone/canopy assembly from the body tube assembly. Use epoxy and make a nice fillet. This will provide extra adhesion and fill in any gaps. Remember, only one, maybe two passes with your fillet tool, or it may get ruined. Also, do not wait too long



Figure 13 - Mask the canopy to apply the epoxy fillet.

to remove the tape. I carefully remove mine after I smooth out the glue fillets. Another tip: wear gloves and have a bottle of rubbing alcohol and paper towels nearby to wipe off any epoxy.

It's now time to add the horizontal tails to the top fin. I used 5-minute epoxy for this, gluing on one at a time. Once the horizontal tails are cured, you can add fillets to all the fin joints. I used masking tape placed 1/8" (3mm) from the joint and 5-minute epoxy on the fin to body tube joints and on the horizontal tails to the top fin joints. Again, remove the tape as soon as you have smoothed the fillets. One other tip: don't try to do too many fillets at once. The epoxy can get away from you very quickly, especially for a 5-minute epoxy. Mix small batches, and if the epoxy has started to thicken, don't use it; just mix another batch. I do one fin at a time.



If you choose to print the decals as shown, you'll need white decal paper and clear decal paper. I have been using the Sunnyscopa laser decal paper available from Amazon. You do not have to clear coat them (like ink jet decals) before using them so there is no fear of the ink running while clear coating.

Here is the horizontal tail dimensioned drawing.

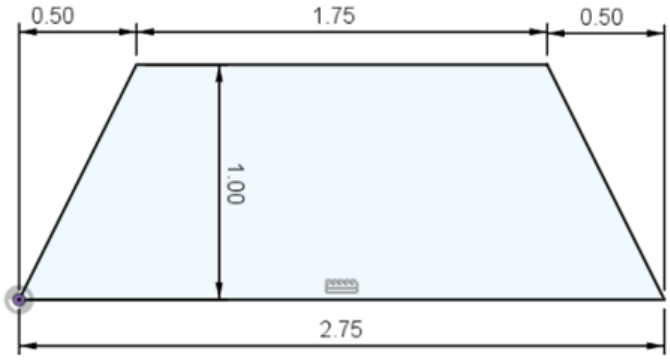
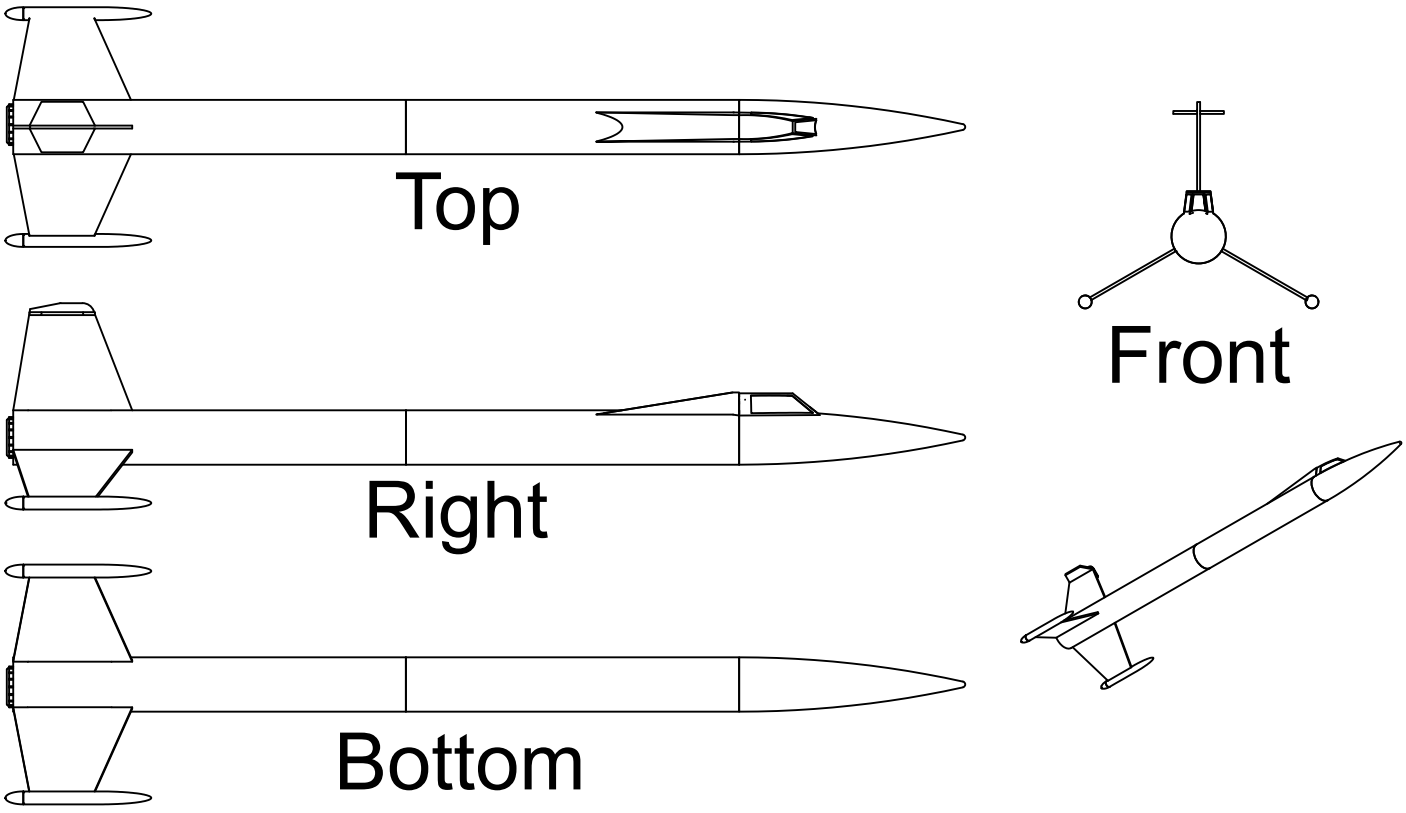
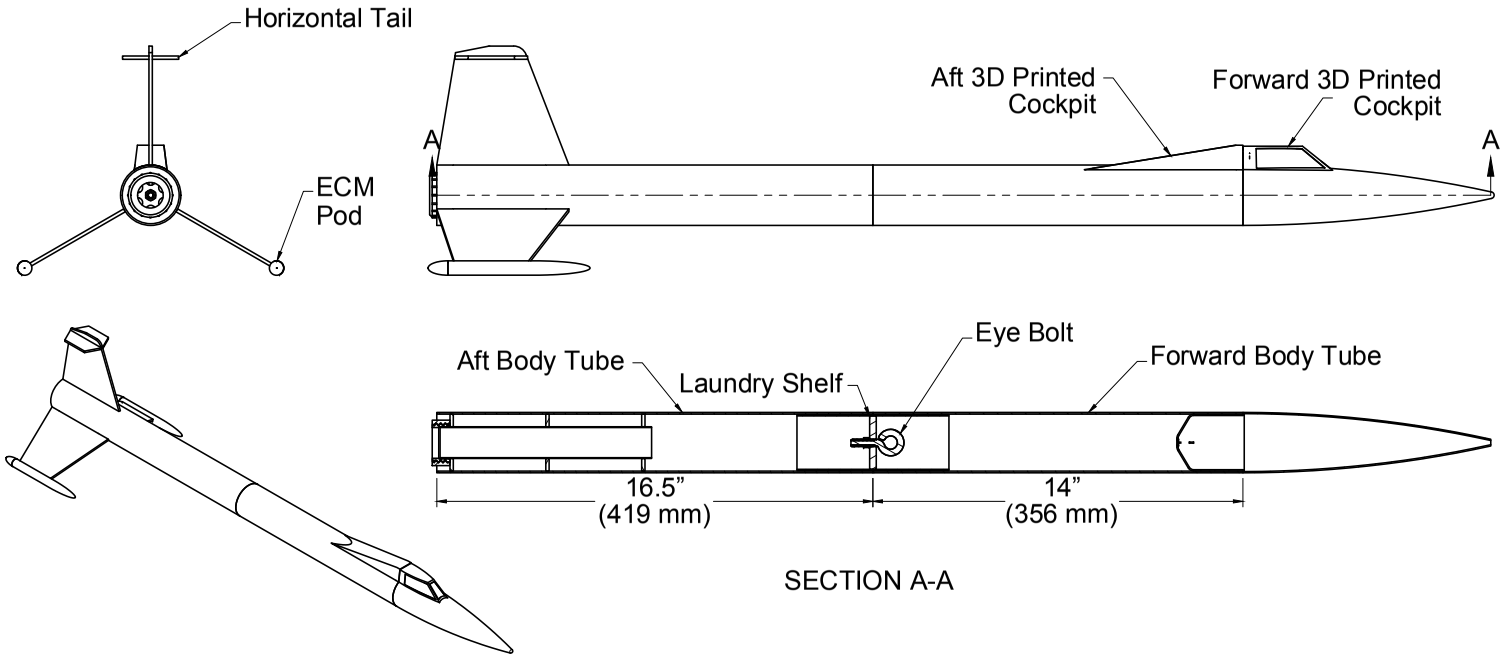




Figure 14 - Robert George and his Lockheed Lancer design.





SECTION A-A

U.S. SPACE FORCE

U.S. SPACE FORCE

U.S. SPACE FORCE

USSF USSF USSF



Decals: Print on White Decal Paper

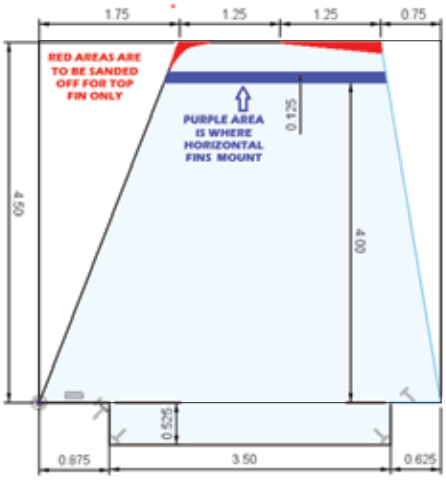
PEAK OF FLIGHT NEWSLETTER
Issue 661 / September 23rd, 2025
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Decals: Print on Clear Decal Paper

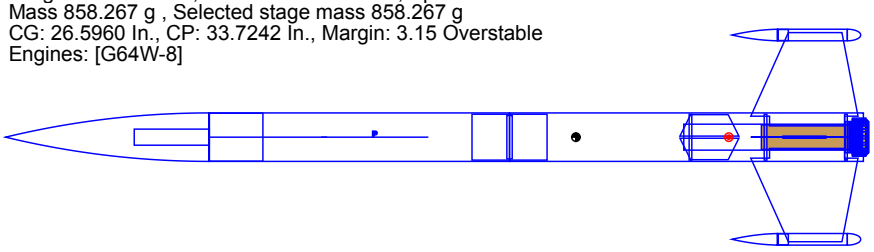


Note: You can download the decals, templates, RockSim file, and the 3D-Printer STL files for this plan at:
https://www.apogeerockets.com/Peak-of-Flight-Rocket-Plans



ROCKSIM

Lockheed Lancer
Length: 40.2428 In. , Diameter: 2.2600 In. , Span diameter: 11.9600 In.
Mass 858.267 g , Selected stage mass 858.267 g
CG: 26.5960 In., CP: 33.7242 In., Margin: 3.15 Overstable
Engines: [G64W-8]



PEAK OF FLIGHT NEWSLETTER

Article Submission Guidelines

Issue 661 / September 23rd, 2025

www.ApogeeRockets.com

SUBMITTING ARTICLES TO APOGEE

We are always looking for quality articles to publish in the *Peak-of-Flight* newsletter. Please submit the "idea" first before you write your article. It will need to be approved first.

When you have an idea for an article you'd like to submit, please use our contact form at **https://www.apogeerockets.com/Contact**. After review, we will be able to tell you if your article idea will be appropriate for our publication.

Always include your name, address, and contact information with all submissions. Including best contact information allows us to conduct correspondence faster. If you have questions about the current disposition of a submission, contact the editor via email or phone.

CONTENT WE ARE LOOKING FOR

We prefer articles that have at least one photo or diagram for every 500 words of text. Total article length should be between 2000-4000 words and no shorter than 1750 words. Articles of a "how-to" nature are preferred (though other types of articles will be considered) and can be on any rocketry topic: design, construction, manufacture, decoration, contest organization, etc. Both model rocket and high-power rocket articles are accepted.

CONTENT WE ARE NOT LOOKING FOR

We don't publish articles like "launch reports." They are nice to read, but if you don't learn anything new from them, then they can get boring pretty quick... Example: "Bob flew a blue rocket on a H120 motor for his certification flight." As mentioned above, we're looking for articles that have an educational component to them, which is why we like "how-to" articles.

You can see what articles and topics we've published before at: **https://www.apogeerockets.com/Peak-of-Flight?pof_list=archives&m=education**. You might use this list to give you an idea or two for your topic.

Here are some of the common articles that we reject all the time, because we've published on these topics before:

- How to get a L1, L2, or L3 Cert
- Building cheap rockets and equipment (pads & controllers)
- How to 3D print parts, or a Rocket Kit
- How to Build a cheap Rocket Kit
- Getting Back Into Rocketry After a Long Hiatus

ARTICLE & IMAGES SUBMISSION

Articles may be submitted by emailing them to the editor. Article text can be provided in any standard word processor format, or as plain-text. Graphics should be sent in either a vector format (Adobe Illustrator, SVG, etc.) or a raster format (such as jpg or png) with a width of at least 600 pixels for single column images or 1200 pixels for two-column images. It is preferable for images to be simple enough to be readable in a two-column layout, but special layouts can be used.

Send the images separately via email as well as show where they go by placing them in the word processor document.

ACCEPTANCE

Submitted articles will be evaluated against a rubric (available here on our website). All articles will be evaluated and the results will be sent to the author. In the evaluation process, our goal is to ensure the quality of the content in *Peak-of-Flight*, but we want to publish your article! Resubmission of articles that do not meet the required standard are heavily encouraged.

ORIGINALITY

All articles submitted to Peak-of-Flight must not run in another publication before inclusion in the *POF* newsletter, but it may be based on another work such as a prior article, R&D report, etc. After we have published and paid for an article, you are free to submit them to other publications.

RATES

Apogee Components offers **$300** for a quality-written article over 2,000 words in length. Payment is pro-rated for shorter articles.

WHERE WILL IT APPEAR?

These articles will mainly be published in our free newsletter, *Peak-of-Flight*. Occasionally some of the higher-quality articles could potentially appear in one of Tim Van Milligan's books that he publishes from time to time.





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