
**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549**

FORM 8-K

**CURRENT REPORT
Pursuant to Section 13 or 15(d)
of the Securities Exchange Act of 1934**

Date of Report (Date of earliest event reported): November 19, 2021

Astra Space, Inc.

(Exact name of Registrant as Specified in Its Charter)

Delaware
(State or Other Jurisdiction
of Incorporation)

001-39426
(Commission
File Number)

85-1270303
(IRS Employer
Identification No.)

**1900 Skyhawk Street
Alameda, California**
(Address of Principal Executive Offices)

94501
(Zip Code)

Registrant's Telephone Number, Including Area Code: (866) 278-7217

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions:

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A common stock, par value \$0.0001 per share	ASTR	NASDAQ Global Select Market
Warrants to purchase one share of Class A common stock, each at an exercise price of \$11.50	ASTRW	NASDAQ Global Select Market

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§ 230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§ 240.12b-2 of this chapter).

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Item 8.01 Other Events.

On November 19, 2021, we conducted a launch attempt for the United State Space Force on our launch vehicle, LV0007. We terminated that launch attempt during the countdown and rescheduled the launch for November 20, 2021 at 12:00 a.m. eastern standard time. On November 20, 2021, we conducted our first commercial orbital launch for the United States Space Force.

Both our launch attempt and the commercial orbital launch were livestreamed through NASA Spaceflight. The video of these livestreams is available on our Twitter account (@astra), our LinkedIn account (linkedin/company/astraspace) and our website at www.astraspace.com. We have also furnished the transcript of the video from the launch attempt on November 19, 2021, as Exhibit 99.2. This exhibit shall not be deemed filed for purposes of the Securities Exchange Act of 1934, as amended (the "Exchange Act") or incorporated by reference in any filing under the Securities Act of 1933, as amended, or Exchange Act, except as shall be expressly set forth by specific reference in such a filing. Once available, we will furnish the transcript of the livestream of our commercial orbital launch from November 20, 2021.

On November 22, 2021, we issued a press release announcing our first commercial orbital launch. A copy of our press release is filed as Exhibit 99.2 hereto.

When we use the phrase "commercial orbital launch," we mean a launch conducted under an FAA commercial launch license.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits

<u>Exhibit No.</u>	<u>Description</u>
99.1	Transcript of livestream video for launch attempt on November 19, 2021
99.2	Press Release, dated November 22, 2021
104	Cover Page Interactive Data File (embedded within the Inline XBRL document)

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Date: November 22, 2021

Astra Space, Inc.

By: /s/ Kelyn Brannon

Name: Kelyn Brannon

Title: Chief Financial Officer

REFINITIV STREETEVENTS

EDITED TRANSCRIPT

ASTR.OQ - Astra Space Inc Launch Vehicle 0007 Day

EVENT DATE/TIME: NOVEMBER 19, 2021 / 4:45AM GMT

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CORPORATE PARTICIPANTS

Thomas Burghardt *NASA Space Flight - News Director*

Carolina Grossman *Astra Space - Director, Product Management*

Will Drewery *Astra Space - VP Supply Chain*

Chris Hofmann *Astra Space - Flight Director, FLIGHT*

Joshua Green *Astra Space - Controller, TANGO*

Dan Wilson *Astra Space - GNC/Trajectory*

Lucas Hundley *Astra Space - Flight Safety and Avionics, FTS*

PRESENTATION

Editor

(Video Begins)

(Video Ends)

Thomas Burghardt - *NASA Space Flight - News Director*

Welcome, everybody. You are looking live at launch vehicle 0007 on the pad in Kodiak Island Alaska. Astra is about an hour away from conducting a test flight with the goal of reaching orbit.

We are coming to you live today from Astra's headquarters in Alameda, California. My name is Thomas Burghardt, News Director for NASA Space Flight and I'm joined by Carolina Grossman, Director of Product Management at Astra. Carolina, thank you so much for joining us [tonight].

Carolina Grossman - *Astra Space - Director, Product Management*

Thank you, Thomas.

Thomas Burghardt - *NASA Space Flight - News Director*

Astra and NASA Space Flight are partnering tonight to bring you this live broadcast. Thank you to Astra for covering some of the expenses associated with making that happen. As usual, we'll be taking your questions from chat over the course of the broadcast, so if you have any questions about today's launch, tag @NASAspaceflight in chat and we're going to answer as many of those questions as time allows.

Let's start off with a quick status update on today's launch attempt. Carolina, how are we looking so far?

Carolina Grossman - *Astra Space - Director, Product Management*

We are keeping our eye on some upper level winds, but we are proceeding with tonight's launch attempt, and you can see that the first stage has been filled with propellant, as indicated by that smoky white area for the - for the top half of the upper [stage].

Thomas Burghardt - NASA Space Flight - News Director

And so, if you are just joining us and maybe being new to Astra, Astra recently celebrated its five year anniversary. This is their fourth orbital launch attempt, so let's take a look at the - some clips from 2016 till now and Astra's five year anniversary.

(Video Begins)

Unidentified Company Representative

The early days of Astra we were all a real big family. We would all finish our morning meeting and then we would all gather downtown San Francisco, which is where we started.

Unidentified Company Representative

Thirty or 40 people designed and built and launched the first rocket.

Unidentified Company Representative

Astra has been an exercise in becoming as efficient as possible, not only in the rocket (inaudible) but also in the way the business operates.

Unidentified Company Representative

What I'm most proud of so far was the rocket 3.2 launch back in December where we made it to space...

Unidentified Company Representative

And watching the upper stage ignite and then take off - I mean everyone was elated, crying, screaming, jumping up and down.

Unidentified Company Representative

Seeing the earth flash up on the screen for the first time from the downward facing camera on the upper stage, realizing that that was - picture being transmitted from the system that we just put into space.

Unidentified Company Representative

Resilience that this team has shown and the grit that this team has shown over the past five years to get where we are today is just phenomenal.

Unidentified Company Representative

The way that the team [pulls together at those times] it's amazing to watch.

Unidentified Company Representative

My hope is that Astra maintains that culture of debate, but also respect.

Unidentified Company Representative

What we are trying to achieve seemed unachievable at that time, and I think we all has to be very close and not just be coworkers but be friends. We all embody that and it allowed us all to work hard and push each other to get to the point we are today.

Unidentified Company Representative

We seem to take on these herculean challenges and be able to knock them down [and to be at the same pace as which our - almost unfathomable] and it's amazing to see sometimes the way that we can get things done.

Unidentified Company Representative

Quite a blast to see this company grow from like a - six people in a garage to where it is today. It's been quite a privilege to be able to [see all that].

Unidentified Company Representative

Happy 5th Anniversary Astra. Happy 5th Anniversary Astra. Happy 5th Anniversary Astra.

(Video Ends)

QUESTIONS AND ANSWERS

Thomas Burghardt - NASA Space Flight - News Director

Happy Anniversary indeed to Astra. We're going to dive into some Q&A now to get all more information about Astra and their mission. We've got a set of questions actually coming to us from the Alameda Boys and Girls Club, right down the street here from Astra, so let's take a look at that.

Unidentified Participant - Alameda Boys and Girls Club - Member

Hi, my name is [Jenai] and [I am in fifth grade] and my question is how long did it take you to build the rocket?

Carolina Grossman - Astra Space - Director, Product Management

Thank you so much for that question, [Jenai]. Right now, it takes us a few months to build the rocket, but we are getting faster and faster every time. One of the most interesting things, I think is that a lot of the material that you see in front of you on the screen actually comes into our factory as sheets of metal and raw material and we fabricate it in our in-house machine shop to become the rocket and the launcher that you see in front of you today.

Unidentified Participant - Alameda Boys and Girls Club - Member

Hi, my name is [Maria] and I'm in sixth grade and my question was how high will the rocket go into orbit?

Carolina Grossman - Astra Space - Director, Product Management

[Maria], that's a great question. For today's mission, the rocket will go 500 kilometers or about 310 miles into orbit and that's about the distance from Alameda to Los Angeles. The rocket will reach orbit in just about 10 minutes though, which is a lot faster than traveling by car or plane from Alameda to L.A.

Unidentified Participant - Alameda Boys and Girls Club - Member

Hi, my name is [Amber]. My question is why is the rocket going into space?

Carolina Grossman - Astra Space - Director, Product Management

[Amber], thank you so much for your question. This is a test flight for us so that we can learn more about how to design and build rockets that can be launched in space on a regular basis. For this mission, we're partnering with the US Space Force to test a payload and see what it would be like to launch real payloads in the future.

And a payload is just the object that's being sent into space. For us, that will be different types of satellites that help our mission of improving life on earth from space, so a lot of those satellites will be doing things like earth observation to help monitor the warming of oceans and deforestation or providing connectivity across the globe.

Unidentified Participant - Alameda Boys and Girls Club - Member

Hello, my name is [Yvonne], I'm in sixth grade and my question is what is the benefit of making a smaller rocket?

Carolina Grossman - Astra Space - Director, Product Management

[Yvonne], we have a need for speed. By making Astra rockets smaller than other rockets [if we're] able to manufacture, transport and launch on a faster timeline, because we don't take up more space or materials than we need. In fact, our rockets fit in a standard shipping container, which makes it easy to transport them to the launch site.

Also, a small rocket is easier to produce in a large quantity which is important to us, because our goal is to launch a rocket every day by the end of 2025.

Unidentified Participant - Alameda Boys and Girls Club - Member

Hi, my name is [Nala] and my question is is there a door on the rocket?

Carolina Grossman - Astra Space - Director, Product Management

That's a good question, [Nala]. There are no people size doors on our rockets, because we're not launching people into space, but we do have about a dozen access doors on the rocket that we use to complete inspections and repairs. They have really funny names like the [doork knight], finding [doory], [doory 2], [griffin door], [drew barrydoor], [Oakland gray doors] and [doora the explorer].

They can vary in size, but are generally about a foot by a foot, and the payload is actually not installed through a door. The way that we install the payload is by taking part that top pointy part of the rocket, which is the [faring], which comes in two halves and then we install the payload and reinstall those two halves of the [faring].

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Hi, my name is [Glen], I'm in sixth grade and what are some benefits of launching a rocket in Alaska?

Carolina Grossman - *Astra Space - Director, Product Management*

[Glen], that is a great question. We're launching from Alaska from the Pacific Space [Fort] Complex Alaska, which is our launch station. And one of the good things about this launch site is that we can launch over the ocean, which helps keep the rocket away from people. And we work with government to keep planes and ships away from the rocket's path.

More generally though, launch sites help determine which locations in space that the payloads on the rocket can reach. Many launches have been near the equator, because that's where earth rotation is the fastest and it gives rockets a boost of speed.

Lots so satellites for earth imaging and observation want to go to polar orbits, which go over the North and South Pole so that they can observe all the points of earth's surface. Launching from Kodiak, Alaska makes it easier to get to those kinds of orbits and in the future, we're planning to operate other space ports in different parts of the world.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Hi, my name is [Anna], I'm in sixth grade. My question is how does the fire come out of the rocket?

Carolina Grossman - *Astra Space - Director, Product Management*

[Anna], that's a great question. The fire coming from our rockets is a large amount of heat and energy that's directed out of our five engines, which enable the rocket to lift off. They're fueled by an explosive combination of kerosene and liquid oxygen. And a fun fact is that a huge portion of the rocket is basically just a gas tank to fuel those engines for flight.

Thomas Burghardt - *NASA Space Flight - News Director*

Thank you so much to the Alameda Boys and Girls Club here in California for all those great questions. We're going to get into some chat questions now. Again, if you have a question about the launch, tag us with @NASASpaceflight.

We're bringing those in and we've got a whole queue of them here, and we're going to start with the - first question is talking about the previous launch for Astra LV0006 which we saw earlier this year. Carolina, let's talk about what has been changed since then?

Carolina Grossman - *Astra Space - Director, Product Management*

Yes, well if you joined us in August, it was definitely a pretty unique rocket launch experience, certainly nothing like anything I've ever seen before, and what happened is that the propellant system that loads - loads the fuel and the liquid oxygen into the vehicle is designed to seal off and separate when the rocket lifts off at T0.

Unfortunately, there was a small leak and some of that fuel and oxidizer combined in the very, very hot exhaust from our engines and combined with a lot of energy and resulted in one of the electronic components of one of our engines sending a signal to shut off one of our five (inaudible) engines.

And all of this happened in less than a second, so the team very quickly reviewed the data millisecond by millisecond and we were able to uncover the cause of the issue, and within just a few weeks, the team worked really, really hard and was able to separate the way that we load the propellants onto the vehicle to prevent this from happening in the future.

And then more broadly, we looked at the way that we test and qualify and verify these components so that we can make sure that we never encounter those issues again. So, hopefully that - that solution that's in place tonight will prevent us from seeing that issue and we will have a - much less sideways flight tonight.

Thomas Burghardt - NASA Space Flight - News Director

Definitely hoping for a smoother launch tonight at just under 43 minutes and counting, towards tonight's liftoff, keeping the questions coming here, one from chat says does Astra have any plans for other rockets after this one? So, we're looking at a version of rocket 3 right now, correct?

Carolina Grossman - Astra Space - Director, Product Management

Yes, but - but [what we see as - as] rocket 3 and we have a lot of great plans for our - for our future rockets, but in tonight's webcast, we're - we're really going to focus on this mission with the US Space Force. And if you want more information about Astra's plans and future, you can check out our website and also our SEC filings - are a great place to find information about our future plans.

Thomas Burghardt - NASA Space Flight - News Director

Well, you keep talking about this particular mission, because we should go into a little bit more detail about what the goals [of] (inaudible) flight actually are. It is a test flight. And it's got a test payload on it, can you just review what the other goals that we're looking to demonstrate here tonight are?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so we are - we are going for an orbital launch attempt with LV0007. Our goals are to reach orbit and the payload we have on this mission is a mass simulator, so we will not actually be deploying the payload that we have on this mission. And you can see we have a camera here that is pointing at lights that will signal when the simulated deployment signal would have gone off.

Part of the reason why we do not want to deploy it is because it's - it's an inert payload and that would create space debris, so we - we are not deploying a payload tonight. This is the United States Space Force's second mission, STP2782 and it is intended to demonstrate Astra's ability to deliver payloads for the Department of Defense.

Thomas Burghardt - NASA Space Flight - News Director

We just saw that camera view inside the payload [faring] and we have a question in the chat from [Nathan] asking are you able to monitor the payload inside while fueling is underway?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so - so that camera is a good indication of how we visually monitor the payload and we have all sorts of different sensors onboard as well where are making sure that all of the environment on the upper stage where the payload is is - remains healthy.

Thomas Burghardt - NASA Space Flight - News Director

[What] we're looking at our screen right now is a live view of rocket 3.3, the latest version of Astra's rocket, this particular one being LV0007 on the [pad]. We see a lot of frost on the outside. We pointed that out earlier, and that's a sign of propellant loading. Can you explain why propellant loading shows us - why we have these visual effects for fueling underway - [as a result of what] propellants you're actually using?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so the vehicle - both of our stages are fueled by the same propellant. We use a - our fuel is RPX, which is essentially kerosene and we use liquid oxygen as our oxidizer and the liquid oxygen that you see is - that top white portion, it's very, very cold, whereas the kerosene is not as cold, so that's why you get that visual demarcation between the liquid oxygen and the fuel.

Thomas Burghardt - NASA Space Flight - News Director

Way to keep the questions coming because we've got a nice healthy queue - an update from the countdown (inaudible) - the teams have just completed FTS checkouts on the pad, and the countdown is proceeding smoothly, we're under 40 minutes and counting now.

Another question from [chat] asks are there any other sites that Astra is planning to launch a rocket from after Alaska's Kodiak site?

Carolina Grossman - Astra Space - Director, Product Management

Well, yes. As we - as we mentioned from some of the Q&A from the Boys and Girls Club, we are planning - our future plans include many - many space ports around the globe, but I just want to take this opportunity to talk about our partners at the Pacific Space Port Complex Alaska and the Alaska Aerospace Corporation who we've been very fortunate to work with over the last several years in launching our rockets and we really, really appreciate their partnership and collaboration with our first test flights and hopefully for many years to come.

Thomas Burghardt - NASA Space Flight - News Director

Kodiak is very interesting when we're talking about Astra, because Astra is one of the very few organizations that actually launches from Kodiak. Can you talk a little bit about the - some of the benefits and maybe some of the challenges from launching from there?

Carolina Grossman - Astra Space - Director, Product Management

Yes, definitely. So, one of the benefits, as you mentioned, there are not many companies that are currently launching out of - out of Kodiak today. This is a great zoomed out view, although it's a little - it's a little dark, but what you would be seeing in the daylight is beautiful, beautiful scenery - Kodiak Island is just absolutely gorgeous.

And because there are not too many launch companies that are launching out of Kodiak at the moment, we find that there is lots availability for launch dates and we really appreciate working with the community there.

And I will say that the biggest challenge that we've experienced, especially with the preparations for this launch has really been the weather. It is very, very cold, I believe around 15 degrees Fahrenheit out at the pad today, so a huge shoutout to our red team for working in those cold, cold conditions, and sure that our cold systems stay cold without freezing and our warm systems stay warm despite the cold ambient temperatures, has certainly been a challenge that we face in launching out of - launching out of Kodiak.

Thomas Burghardt - NASA Space Flight - News Director

How does the rocket get to Kodiak, because it's built here in Alameda California right?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so everything that you see actually fits inside a shipping container. So, the rocket fits inside a 45 foot shipping container and is everything else that you see all of the ground support equipment, we're able to ship using typical logistics, so we're over trucks and boats and sometimes even aircraft to make it to the launch pad.

So, really what you see here that's provided and remains fixed on the ground is that fence, the polls, the lightening protection system and the tent, but everything else, we bring with us to the pad, and that's one of the things that makes Astra unique is that really all we need is a concrete pad and an internet connection and we can - we can set it up ourselves.

Thomas Burghardt - NASA Space Flight - News Director

And we have another question from [chat] asking is 2025 a good year to graduate in aerospace engineering - [potential] Astra hires [in check]?

Carolina Grossman - Astra Space - Director, Product Management

I will say our future plans are very exciting and they don't stop at 2025, so I would say that any year is a great year to graduate in aerospace engineering but I think also one of the exciting things about the team here at Astra is we have a ton of aerospace engineers but we come from many, many different backgrounds, a lot of folks who come from software companies, from robotics, from the automotive industry.

I myself have a background in biomedical engineering, so we have a very diverse team here in terms of our - in terms of background.

Thomas Burghardt - NASA Space Flight - News Director

We're coming up on T minus 35 minutes and counting. Again, if you have any questions about today's launch, go ahead and tag us with @NASASpaceflight, we'll continue to answer as many of those as we can, as the countdown progresses. Of course, once we get a little later into the countdown, we're going to give some more updates about what exactly we'll expect during this flight and [keeping you updates] on the countdown as it progresses, but right now clocks are still ticking.

The next question in chat - [Sonya] asks what happens to each stage of the rocket after launch? Will anything remain in space or will all return to burn up in the atmosphere?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so the - we - our rocket is not reusable, so the first stage will fall back into the ocean and then the upper stage will - will - once it reaches orbit will be de-orbited and burn up in the atmosphere, so we do consider it very important to be responsible stewards of space.

We do not want to leave any space debris up there in the future, and so our upper stage will burn up in the atmosphere. And similarly, many of the small satellites that - that we would take up in the future would be - would have a limited lifetime and burn up in the atmosphere as well.

Thomas Burghardt - NASA Space Flight - News Director

Another question in chat, and you know what, it would not be a NASA Space Flight livestream with a - without a question quite like this, a question about what are those towers around the launch pad?

What - those light poles (inaudible) [around on the site] look like they must take a beating. What kind of protection does your pad equipment have against rocket exhaust and potentially other things, because again, we can't not ask about the poles around the rocket, it's a thing around here?

Carolina Grossman - Astra Space - Director, Product Management

Yes, now I - now I'm prepared for that [lightening system question], so that - so that is our lightening protection system, which helps keep all of our equipment safe in the event of lightening in the atmosphere.

And certainly, it is not a very forgiving environment being out on the launch pad, but we do protect a lot of the strong back, which is that tall arm that - which you see has a lot of plumbing and protected as much as possible from the exhaust of the engines.

But otherwise, because our rocket's relatively small we - and we expect it to lift off, everything else on the pad is in pretty safe condition. And most of the beating that the lightening protection system will take is from the elements out there in Kodiak.

Thomas Burghardt - NASA Space Flight - News Director

You know, [while] we're looking around some of the other things surrounding the launch pad, we do notice one other thing, there are a lot of open gates round this rocket, not a coincidence I don't think?

Carolina Grossman - Astra Space - Director, Product Management

You know, keeping the gates open is actually a standard part of our launch procedure, but it was a very good thing to have the gates open during the LV0006 flight because it very politely went right out the gate.

Thomas Burghardt - NASA Space Flight - News Director

Good to see that's still in place. (Inaudible) questions coming from chat. We have a question asking how long will the first stage fire during today's ascent?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so closer to our teaser at time, we'll go through the detailed mission profile, but first stage flight is about 3 minutes long.

Thomas Burghardt - NASA Space Flight - News Director

And how does that compare to the upper stage? The upper stage fires longer, right?

Carolina Grossman - Astra Space - Director, Product Management

Yes, the upper stage fires for closer to six minutes, so our overall time is - in - to reach orbit is under 10 minutes.

Thomas Burghardt - NASA Space Flight - News Director

[Gotcha]. When we were talking about the flight profile, we had another question in chat asking can you go over what would be considered a fully successful flight profile for today's mission?

Carolina Grossman - Astra Space - Director, Product Management

Yes, our main objective today is reaching orbit, so that would mean the successful completion [of passing through max Q] in first stage flight then main engine cut off. Then we'll separate the [farings] and the first stage from the upper stage.

The upper stage will then light and at second engine cut off or SECO, we will have reached orbit. And at that point, we will send that signal to simulate the payload deployment. Again, we will not be deploying a payload on this - this flight.

Thomas Burghardt - NASA Space Flight - News Director

And next question, we talked about the red team earlier and a shoutout to them working out in the cold, can you tell us what is actually the red team?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so our red team is the very, very small team of folks that goes all the way up to Alaska with the vehicle. It is a small team because we want to be pretty nimble, but we also want to maintain enough folks that we can have a buddy system and maintain safety. So, we give a huge, huge shoutout to them.

I can briefly go through who our red team is today, our red lead, who is responsible for all of the activities and safety of launch pad related operations is [Adam Frish]. Then red 2 is [Hil Hudson]. Red 3 is [Robert Freeman]. Red 4 is Eric Larson.

Red 5 is [Sam Heershap]. And they are all the folks who operate the hands on hardware before our remote systems take over so they're out here making sure that the rocket is setup appropriately, that all of our ground support equipment is in good shape.

And then we have our IT - [Eric Steinberg], who specializes in our communication systems and AV system. We've been working a lot with him to make sure that this livestream goes smoothly. And finally, safety is [Ryan Herschfeld] and he's responsible for the overall safety of our launch operation, including making sure that personnel are complying with our safety policies and procedures.

Thomas Burghardt - NASA Space Flight - News Director

We also have a lot of other team members that we want to introduce. Really quick, before we continue we should point out that we have just entered a hold at T minus 30 minutes. We'll get you an update on that as soon as we'll can. But let's look at the other team members who are working on this hold right now.

Carolina Grossman - Astra Space - Director, Product Management

Yes, so the camera that you are looking at right now is focused on our mission control here in Alameda in our - in our HQ. And as you can see again, it's a pretty small team, and I can briefly go through the folks who are in mission control.

First, we have [Chris Hoffsman], who is our Flight Director. He is responsible for overseeing and directing launch vehicle operations [following] the countdown with authority to call, hold, recycle or abort as required. As a fun fact, on the side, [Chris Hoffsman] runs Rocket Cat Rescue, so we love to support Rocket Cat Rescue here at Astra.

Then to his left, with the googly eyes, [Thomas Rent], who just stood up is our Flights Activities Officer, and he's responsibility for logging the day's activities and making sure that we note any actions that need to be completed after the fact.

Continuing clockwise, [Chris May] is Command [at] Data Handling or CDH. He monitors and adjusts [state] machines as needed and follows the commands of the Flight Director. Then [Joshua Green] is our vehicle controller with a call sign of Tango, and he's responsible for operating the terminal which actually controls the vehicle systems under the direction of Flight Director. So, you'll be hearing a lot from Tango as we proceed through the countdown.

[Dan Wilson] is our GNC, guidance, navigation and controls guru, and he's responsible for making sure that wind and weather trajectory information is up to date, property loaded and meeting all of our flight criteria.

And finally, [Lucas Hunley], which is Flight Safety, call sign FTS, who's responsible for our flight safety system and making sure that all of our systems are operating [nominally].

Thomas Burghardt - NASA Space Flight - News Director

That's a look at the Astra team and that team is currently working a hold at T minus 30 minutes. [If this is the] people we just saw - there are some other call signs that we may hear later in the countdown too, that we did actually see there, right?

Carolina Grossman - Astra Space - Director, Product Management

You're right. Out - outside of mission control, we have what we call the engineering backroom who are the engineers who are responsibility for their respective systems on the vehicle, and so they are not in a control room, but they're actually distributed throughout our office.

They set up their desk and monitor their systems and you'll hear folks like Ace, who's our ground software system, Oden is our flight software, Delphin and Ether are our engines. We have Booster, which is the first stage system, Orbit which is the second stage system and Launcher our ground support equipment. You may also hear Panther who is our backroom engineering coordinator.

Thomas Burghardt - NASA Space Flight - News Director

While those teams continue to work this hold, we're going to take a break from the commentaries so we can look and see if we can get you an update on the status of today's countdown, so let's listen in to the [pen lights] as rocket 3 sits ready to prepare to re-enter the countdown hopefully here, shortly. Carolina, do you have an update for us on the hold at T minus 30?

Carolina Grossman - Astra Space - Director, Product Management

We do. The team is taking some extra time to verify some of the upper stage systems on the vehicle, but we're hoping that we are able to verify what we - what we need to confirm and proceed with our countdown shortly.

Thomas Burghardt - NASA Space Flight - News Director

Meanwhile, we'll go back into some questions while we wait for a resolution on that hold here. So the next question from chat comes [Josh], asking how much does this rocket cost? And what's the target price when manufacturing becomes more streamlined?

Carolina Grossman - Astra Space - Director, Product Management

So, I - I can't talk specifically about price, but what we can talk about is some of our manufacturing technologies and what we're - we're building to scale. So, from day one, our mission has been daily space delivery and we were always designed to scale. We - we know that high performance (inaudible) vehicles are very, very expensive, so we have designed a mass production vehicle, which has been our strategy and we've been iterating on this design for years.

And our approach is that every version of this rocket becomes less expensive to produce and to manufacture and to operate. And as we are able to scale this process and offer more launches, it could provide [an operate] - an opportunity - excuse me, for many of our customers to allow us to offer them more services, both less expensive services and also more responsive services with the high frequency of launches that we hope to deliver.

Thomas Burghardt - NASA Space Flight - News Director

Speaking so streamlining and simplicity, we have another question in chat asking why the simple names, like rocket and launch vehicle?

Carolina Grossman - Astra Space - Director, Product Management

Yes, we are on a path to scale for everyday launch, and so we want to - we want to always keep that in mind, and so we keep things simple. One of our values is simplify to scale and using simple names like rocket and LV and using serial numbers, even though they're low numbers right now, we will hopefully grow to many, many numbers in the future.

Thomas Burghardt - NASA Space Flight - News Director

There are certainly a lot of zeros in front of the serial number right now, so there's definitely room to grow. We see that happening.

Carolina Grossman - Astra Space - Director, Product Management

Absolutely.

Thomas Burghardt - NASA Space Flight - News Director

Another question from chat, we are in a hold right now as teams [work some upper stage data] so a relevant question now is how long is the window for today's launch?

Carolina Grossman - Astra Space - Director, Product Management

I believe we do have a couple more hours remaining in today's window and we do have another opportunity tomorrow, should we not be able to successfully launch tonight, but again, we are keeping our fingers crossed that we're able to verify what we need to double check on the upper stage and we'll hopefully be picking up (inaudible).

Thomas Burghardt - NASA Space Flight - News Director

While teams continue to work this hold, we're going to show some highlights from the factory tour, which [Ashuma] was so kind to show me around here in Alameda, not too long ago. And we've got some interesting [footage] from that that we can look at, so let's take a look.

(Video Begins)

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, what are we looking at out here?

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Yes, so this is an old jet turbine engine test facility. This is Astra's current bucket engine test facility. So, what you're looking at is two test cells that started out identical. They used to be used for - like I said, jet turbine engine testing and each test cell has three towers.

For jet engines, you actually burn the fuel using the oxygen in the air, so that first tower is actually the [inlet] tower. When you're moving so much mass [flow] because of the amount of gas that you're producing, you pull a pretty strong [venturi] through there, so the center tower is actually to allow mixture air to come in and dilute the exhaust air.

Then we have acoustically damped tunnel there, and then an exit tower. So, because our rocket supplies its own oxidizer in the form of liquid oxygen, we actually don't use that first tower, so we just close it off and we use the latter two.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Could we go take a look inside?

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Yes.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Let's do it.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Yes, so these doors are color coded. Green means you can enter, there's nothing dangerous going on. Yellow, means go in with safety glasses, if you have business being in there. Red means don't go in.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

[Gotcha].

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, they're green, so we can go in.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Sounds good.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, we're stepping through about 2.5 foot thick concrete barriers into the test cells...

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Oh, wow.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

... which are a little bit colder than everything else. But basically, what you're looking at is [a - kind] of a rocket deconstructed. So, you've got a liquid oxygen tank, you've got a fuel tank, you've got valves, you've got metering devices, you've got flow tubes, anything the rocket might be able to do, you can simulate here, you know, running different pressures [at different floor] rates, all of that.

We've got things like [low tells] so we can tell - usually I describe this to people as the fuel efficiency of the engine, which...

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Sure.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

... is more digestible than ISP.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Right.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

But yes, that matters a lot, as you know, for actually being able to get to space. So, the combination of the flow meters and the [low tells] actually give us that data.

I mentioned before there are three towers per test cell. The intake tower is the one that's above us...

Unidentified Participant - *Alameda Boys and Girls Club - Member*

[Oh], (inaudible)...

Unidentified Participant - *Alameda Boys and Girls Club - Member*

... so this [air diverter] is actually not being used. This is (inaudible) in its [stoic] position. We didn't have to do anything for this. And then I'll show you the other two towers as we walk through here.

So, if you can imagine, across those big black pipes there, a jet turbine engine was [humming] from those pipes and made fire down the tunnel.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Gotcha.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, this [stand] is designed around the full thrust of our first stage. You can see it's quite [beaten]. We use it only really for one engine at a time here presently...

Unidentified Participant - *Alameda Boys and Girls Club - Member*

[Right].

Unidentified Participant - *Alameda Boys and Girls Club - Member*

...but the structure of the [stand] is designed around that sort of capacity.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, this would be a vacuum engine based on that [build] correct?

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Yes, so this is a vacuum ether engine upper stage engine. You'll also see right behind - right in front of [Zach] here, this is our ground based igniter.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

Oh, OK.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

So, that fire [really igniters] from the engines, we actually removed 33 valves from the rocket.

Unidentified Participant - *Alameda Boys and Girls Club - Member*

There you go.

Unidentified Participant - Alameda Boys and Girls Club - Member

Very clever ignition system [fuses], very simple methods and pieces of equipment, not a lot of crazy custom stuff.

Unidentified Participant - Alameda Boys and Girls Club - Member

(Inaudible).

Unidentified Participant - Alameda Boys and Girls Club - Member

So, this actually - it replicates exactly what's on our launcher [and there's an additional actuator] to move this whole table out of the way, so we don't overheat during a (inaudible) [on fire], because our launcher is not designed for...

Unidentified Participant - Alameda Boys and Girls Club - Member

[Right].

Unidentified Participant - Alameda Boys and Girls Club - Member

... (inaudible) [fulteration] fire next to it.

Unidentified Participant - Alameda Boys and Girls Club - Member

Yes.

Unidentified Participant - Alameda Boys and Girls Club - Member

So, this is a (inaudible) upper stage engine. If you stand over here and just face me, you'll notice that one of your ears is probably hearing a little less than the other, because this is an acoustically [jammed chamber] so you'll hear less coming from this side than you will from that side.

Unidentified Participant - Alameda Boys and Girls Club - Member

A little bit, yes.

Unidentified Participant - Alameda Boys and Girls Club - Member

Yes. So, it's really [damped] - it's quite effective, so when we're doing hot fires here in the test cells, it's actually less - it's quieter than a plane flying overhead from the Oakland airport.

Unidentified Participant - Alameda Boys and Girls Club - Member

[Ah, very, very] cool.

(Video Ends)

Thomas Burghardt - NASA Space Flight - News Director

The Astra teams are still working a hold at T minus 30 minutes. We'll continue to provide updates as soon as we have them. In the meantime, we are joined by Will Drewery, Vice President of Supply Chain here at Astra. Will, thanks for taking some time to come chat with us.

Will Drewery - Astra Space - VP Supply Chain

Yes, absolutely. Thanks for having me.

Thomas Burghardt - NASA Space Flight - News Director

Let's start off with a question about what you're doing here at Astra? What is your job or your responsibility as VP of Supply Chain?

Will Drewery - Astra Space - VP Supply Chain

Yes, so my responsibility as the VP of Supply Chain is that my team is responsible for sourcing all the parts and components that we use to build the rocket, getting those parts here to the factory where (inaudible) we can receive them, store them [and] distribute them to all the teams that need to use them to build the rocket.

Once we [have] built it, our team is responsible for also just transporting it up to Alaska of wherever else we're going to be launching.

Thomas Burghardt - NASA Space Flight - News Director

And I believe we actually have some pictures of your team (inaudible).

Will Drewery - Astra Space - VP Supply Chain

... (inaudible) when we shipped our rocket and [strong back] up to Alaska, so this first picture here, you can see our high cube, which is the base of our launcher system. And the rocket and [strong backer] and the shipping container in the background there - believe it or not, the entire crew actually flew up alongside this payload on [the] C17.

Here's another really cool picture. We have our Head of Engineering and also [Chris Hoffman], who leads the launch operations team. And we are all there in front of the plane. You can actually get a sense of the scale. This is one of the largest planes that the Air Force has in its fleet. The only thing larger than this would be a C5.

And this is also - a very cool - also a very cool picture, you can see the plane as it takes off. You know, there are a lot of really cool days here working at Astra, but I have to say that this is - was one of the coolest days.

Thomas Burghardt - NASA Space Flight - News Director

That is definitely very cool, and sending the rocket off on that plane to Alaska, must be one of the last steps in your journey, right?

Will Drewery - Astra Space - VP Supply Chain

So, that's what most people would think, but actually our team is responsible for everything up until we launch the rocket. So, if the team needs any spare parts, if people need to fly up last minute, we're responsible for making travel arrangements...

Thomas Burghardt - NASA Space Flight - News Director

OK.

Will Drewery - Astra Space - VP Supply Chain

... chartering flights and doing all the things necessary to get the stuff there.

Thomas Burghardt - NASA Space Flight - News Director

That makes sense, of course. How has your background prior to Astra helped you - help - prepare you for this role here?

Will Drewery - Astra Space - VP Supply Chain

Yes, so I've done lots of things. I started my career in federal consulting, so I worked out of Washington DC, and also spent some time overseas in Iraq working with factories there. I moved out to Silicon Valley about 10 years ago and working in supply chain and automotive, and I spent some time in a [startup role in] robotics and in construction.

So, I've - over the years really just gained an affinity for supply chain and - and it's been really cool to just apply some of the lessons that I've learned from those other industries to the aerospace industry here at Astra.

And I think, even the approach that we take to building a rocket is very different where in most companies it's like an engineering project and here, we treat the rocket much more like a product that has a bill of materials and has a production cadence and so on and so forth.

Thomas Burghardt - NASA Space Flight - News Director

That's interesting. Do - how closely do you work with the engineering teams? Because as supply chain person, you have to be balancing the potentially higher performance, maybe [be] higher cost materials or components to source, versus some lower cost options that might have a performance (inaudible) associated with it?

Will Drewery - Astra Space - VP Supply Chain

Yes, [yes] that's a good question. We work very closely with the engineering team. So, our engineering teams are responsible for specifying all the parts that we use on the rocket, so you can think of this like - they give us all a description of what they need and all the drawings that we need to have our supplier partners [fill out] and make. And they're the ones that actually work with us to make sure that we are getting the right parts, the right level of quality.

And you asked another question about like the level of quality that - and how we balance high cost, high precision parts versus lower cost components. And one of the cool things - or actually two of the cool things about working here at Astra is that one, we are building a consumable rocket that does not need to be reused, so that makes things a little bit simpler for us. We need reliable parts that are going to work, but those parts don't need to be over-engineered to survive reentry into the atmosphere.

And the other thing is that we are launching payloads. So, when we're not [lodging people] we're able to experiment with different types of suppliers that wouldn't otherwise be available to just any other rocket builder.

Thomas Burghardt - NASA Space Flight - News Director

That makes a lot of sense. How have you also worked to bring manufacturing of things in-house and vertically integrate the whole rocket production process for Astra?

Will Drewery - Astra Space - VP Supply Chain

Yes, we're doing lots of things here. So, another cool thing about being here is that - doing supply chain at Astra is that we're [building more production rates], so we can actually source things in volume. But that also means that we're - we have some levers available to us in terms of automation.

So, our [teams are] working really hard to actually build up an automated production line, specifically we're working on this really cool project for our first stage that would help us automate the production.

Thomas Burghardt - NASA Space Flight - News Director

And then we're talking about materials and manufacturing sourcing and things like that, what about the human side of it, what are you looking for when you're sourcing? Human Resources [and the] talent for your supply chain or [greater] (inaudible) team?

Will Drewery - Astra Space - VP Supply Chain

Yes, so our team has grown tremendously over the last year. And we expect to continue that trajectory into next year. We are constantly looking for great people that - I mean aside from all the things that you would expect like just - having the right technical skills to do the job, we're really looking for people who are going to bring a certain level of creativity to this job.

We are building rockets in a different way than most other companies, and we're just doing things differently, so I want people who are able to approach problem solving just from a first principles approach.

And this has been a very fun place to work. So, I want to make sure that the people that we're bringing in are going to be a culture add into - help us to continue that amazing trend here.

Thomas Burghardt - NASA Space Flight - News Director

Absolutely. One final question for you, Will, what is the most exciting part of Astra's mission to you personally?

Will Drewery - Astra Space - VP Supply Chain

So, Astra's mission is to improve life on earth from space, and that actually is very endearing to me, because there are lots of companies that are focused on sending things to in to [the] solar system.

And I think that our mission of being focused inwardly on improving the lives of people here on earth through improved communication, through imaging and things that will make it easier for us to track things like deforestation and all those - like those types of problems, they really resonate with me.

So, that gives me meaning to the things that we do and it's like a motivator whenever I'm thinking about like a good reason to do what we do, that mission is really what motivates me.

Thomas Burghardt - NASA Space Flight - News Director

That's awesome. Will, thank you so much for taking some time to come and speak with us on today's broadcast. And good luck with the launch.

Will Drewery - Astra Space - VP Supply Chain

Yes, and if you don't mind, I have a few people I want to thank, so - this day wouldn't be possible at all without the support of our partners. We've had NASA, US Air Force, the US Space Force, they've all been phenomenal partners for us, just helping us get all the resources that we need to make this possible.

I also want to give a shoutout to our supply chain team. They worked tirelessly to make sure that we get everything we need to make this day possible and also, my family, my wife has put up with many early mornings and many late nights.

And my two kids, [Solomon] and [Michaela] they're amazing. I hope they're in bed right now. I can show them a recording in the morning, but they're also very excited about what we do here, so thanks to [all of them].

Thomas Burghardt - NASA Space Flight - News Director

Very cool. And Will, thank you so much for joining us today. Again, if you're just joining us, we're in a hold at T minus 30 minutes right now. Teams are working on evaluating some aspects of the upper stage right now. We'll give you more updates as soon as we have them.

In the meantime, let's listen into the countdown and the mics at - out at the pad, while we wait for some more information. And hopefully we can get this countdown back underway before too long. And if you're just joining us, we are still holding at T minus 30 minutes as the teams work [an] upper stage evaluation.

In the meantime, we're going to dive back into some questions. Again, if you have questions about today's launch, please tag us in chat @NASASpaceflight. We're answering as many of those as we can. And our next question comes from [Matthew] asking if Astra has an internship program in the works?

Carolina Grossman - Astra Space - Director, Product Management

Yes, we do have an internship program at Astra. And you can learn more by going to our website astra.com and checking out the careers page. We are hiring for a lot of roles across the company, both full time and internships as well. So, please come join us.

Thomas Burghardt - NASA Space Flight - News Director

And a related question about the workforce here at Astra, why (inaudible) I mean the employees must be very tired, says [Luigi] and if this is a test flight, the rocket doesn't need to go to a very specific orbit, correct?

Carolina Grossman - Astra Space - Director, Product Management

Yes. So the launch window timing is determined by the FAA and actually, because Kodiak is very close to Anchorage, Alaska, which is a very, very busy airport, we do try and minimize the impact, especially during this time of year, which can be very busy with holiday travel and lots of cargo.

So really, the simple answer is that the FAA has determined that this is the window available for us for this launch and the team here has been shifting their hours over to this nightshift over the last couple of weeks in order to minimize fatigue and be bright eyed and bushy tailed at these hours.

Thomas Burghardt - NASA Space Flight - News Director

We got a question from [Tiffany] asking I may have missed this when talking about the shipping container but how tall is the rocket itself?

Carolina Grossman - Astra Space - Director, Product Management

Sure. So, the rocket is 43 feet long from tip to tail, and so that fits pretty snugly in a 45 foot shipping container.

Thomas Burghardt - NASA Space Flight - News Director

And a related question from [Max] asks why did you guys extend the first stage?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so we extended the first stage between the rocket 3.2 launch, which was in December of 2020 and our launch of LV0006 back in August. So, at that point, we - after having very, very nearly reached orbit in December of last year, we took the opportunity to do a - some design changes to our systems to help us scale to something that we wanted to produce at a quantity of flying at (inaudible) approximately [monthly rate].

And so, one of those changes was to stretch the first stage by about 5 feet and that allowed us to get more propellant to keep the engines running for longer and get us a little bit more performance capacity out of that rocket.

Thomas Burghardt - NASA Space Flight - News Director

(Inaudible) another question from [Tim] asking what has been the biggest challenge of designing and manufacturing this rocket?

Carolina Grossman - Astra Space - Director, Product Management

I can say we - there are many, many challenges in designing and manufacturing a rocket, as the saying goes, it's only rocket science, right, but I can say that one of the things that - a challenge that I think we embrace at Astra is that we're trying to do things differently from the rest of the industry. We're trying to do everything in as a low cost and scalable way as possible, and sometimes that can be - that can lead to challenges when we're trying to build and test and fly at a rate that no one has ever seen in the industry.

Thomas Burghardt - NASA Space Flight - News Director

Next question for some of the views from mission control that we saw - a question from [Patrick] asking why does GNC have a joy stick?

Carolina Grossman - Astra Space - Director, Product Management

So, I don't know if we can switch to that mission control view, but we do have some funny things in mission control. You can see our GNC, [Dan Wilson] who's sort of second from the left there has a joy stick on his desk - and I will say that it's just for fun, the vehicle is entirely flown by an algorithm that is preprogrammed in flight.

But otherwise, at mission control, we have some googly eyes on consoles, we have really fun wolf blanket, not visible in the cameras, but we have - we have some prayer candles for good luck as well, so these are just - most of these done really have specific stories, but are more of a why not - we'll - we'll take all the luck and the - and - that we can get, and we try and keep a sense of humor here at Astra.

Thomas Burghardt - NASA Space Flight - News Director

I love it. Some more questions have come through here, a question from [Thomas] - cool name, [Thomas], says how long can the rocket hold while partially fueled? Where - what kind of [fueling state] are we in right now actually?

Carolina Grossman - Astra Space - Director, Product Management

So, I believe that we are fully - fully fueled and we can hold for quite some time. This is a pretty stable state that the rocket's in, so we can hold for - I believe we have had under - just under 90 minutes left in our window, so we can hold through to the end of that, but we can hold for several hours in this state, as long as the rest of the systems are operating nominally, which at this point, aside from the question about the upper state, everything else appears to be [nominal].

Thomas Burghardt - NASA Space Flight - News Director

[Gotcha]. Related to - you know, the [fueling commission] of the rocket, we're seeing a lot of vapors around the rocket [and actually] coming from the transporter [erector mixed with as well], a question in the chat asking what we're seeing there?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so a lot of what you're seeing is that really cold oxygen - that liquid oxygen that is much colder than the ambient temperature, and so it makes that sort of steam or smoke, and as well, we have vent lines to make sure that we're keeping the system at the appropriate pressure.

And so that's - that's that white pipe you see sticking [up the strong back] near the Astra logo or the American flag right there, that's just making sure that we're - we're keeping everything at the appropriate pressures.

Thomas Burghardt - NASA Space Flight - News Director

Another question from chat, asking does anyone know the path of the rocket? Would it be possible to view it from Southeast Alaska and Northwest British Columbia?

Carolina Grossman - Astra Space - Director, Product Management

Well, I'm not - I've - I - well there we go, we have a great host of the vehicle's trajectory there, so if you are near that area, you'll - you'll be able to see it.

I can say from my own past experience - I grew up in Florida and some of the night launches of the space shuttle were very, very clearly visible in the night sky, and so hopefully, folks in that area can get a great view of LV0007 on its flight to orbit tonight.

Thomas Burghardt - NASA Space Flight - News Director

You hear that, chat, we got the shuttle reference in for the [NSF] stream. You have to every single time. Today's mission is going to an 86 degree inclined orbit I believe...

Carolina Grossman - Astra Space - Director, Product Management

Yes.

Thomas Burghardt - NASA Space Flight - News Director

... is that correct?

Carolina Grossman - Astra Space - Director, Product Management

That's correct, 500 kilometers and 86 degrees [is - as the] orbit we're shooting for tonight.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. And related to the trajectory, we have a question in from chat asking how does this affect the downstream boating or fishing in the area?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so like I mentioned earlier with our launch window, we try and minimize the impact that we have on travel in the surrounding community, and we work closely with government in order to issue notices to airmen and notices to mariners or [nodums and nomars] to make sure that the area is cleared.

And we also work with the Coast Guard to make sure that there are no boats in the [keep out]. We know that this can be a busy fishing season and so, we do our best to minimize those impacts as well.

Thomas Burghardt - NASA Space Flight - News Director

Next question comes from [Jordan] in chat asking why does the Astra rocket 3 have five engines?

Carolina Grossman - Astra Space - Director, Product Management

Yes, so the first stage engines are built in-house and totally designed and tested in-house. They're known as the Delphin engines. And we have five of them because each of them produces about 6,500 pounds of thrust and the total thrust that we need is worth five of them.

Thomas Burghardt - NASA Space Flight - News Director

Another question asking some - for some specs on the thrusters used on the rocket, so can you give us some more detail about the engines and also maybe the upper stage engine too?

Carolina Grossman - Astra Space - Director, Product Management

Absolutely. So, like I mentioned, our engines, the Delphin engines on the first stage, as well as the [ether] upper stage engine are all designed to sit in and built in-house here at our headquarters in Alameda. And we have five of those Delphin engines on the first stage, each producing 6,500 pounds thrust so - as I mentioned earlier.

Both stages are fueled by the same propellants, which is liquid oxygen and RPX which is similar to kerosene. And then our Delphin engine is an electric pump, that engine so we use pumps that are powered by batteries to bring the propellants into the engine and ignite them.

And then on the upper stage, that's the Aether engine. We have one of those and it produces 740 pounds of thrust. And it is — as I mentioned also propelled by LOX and kerosene. And it is a pressure-fed engine so it is much simpler. It doesn't have those electric pumps. We rely on the pressure in the tanks to feed the propellant into the system.

Thomas Burghardt - NASA Space Flight - News Director

This is Astra's fourth orbital launch attempt. And again we were broadcasting live for LV0006, the precursor to this flight. And we have another question, [which asks], can we go over again, what changes have been made since the last launch attempt?

Carolina Grossman - Astra Space - Director, Product Management

Sure. So for those of you who are just joining us, the issue that we saw with our LV0006 launch attempt in August was due to some fuel and oxidizer leaking at T zero, a very small quantity leaking and igniting under the very hot exhaust from those first stage engines which caused some of the electronic components on those engines to shut down one of them.

And so really the main change that we have made to the system is separating that fuel and oxidizer loading system and making sure that there is a much smaller likelihood that those can combine at liftoff. And in addition looking at our verification methods, our test program, and improving those as well so we can make sure to catch these issues proactively in the future.

Thomas Burghardt - NASA Space Flight - News Director

I believe actually, part of that actually entailed relocating where those connections were on the bottom of the rocket which the fact that you made that change after the rocket pretty much existed, already before the previous launch is impressive. But that's kind of how Astra is built to quickly iterate in this phase of development, right?

Carolina Grossman - Astra Space - Director, Product Management

Certainly. Yes. It was a very, very impressive effort by the team. A lot of — a lot of work by members of the First Stage Team of our — of our test team. And we're very grateful for all of their efforts in getting us back to the pad as quickly as we could really. It's — it's how we like — we like to learn and iterate rapidly. And I think we have proven that with this LV0007 flight coming under three months from our last launch attempt.

Thomas Burghardt - NASA Space Flight - News Director

Another question from Chat, asking, what material is this rocket made from?

Carolina Grossman - Astra Space - Director, Product Management

Yes. One of the things that makes Astra unique is that we try and use much simpler materials. The things that are less expensive. We use a lot of aluminum is I think the primary material that our vehicle is comprised of. And we used — as simple as — our manufacturing methods are really as simple as possible. So that is I think one of the things that sets us — sets us apart and is one of the ways that we think differently from the rest of the rocket manufacturers in the industry.

Thomas Burghardt - NASA Space Flight - News Director

And we can see that you can look at the bottom of the rocket that you're seeing on your screen right now. You can see the bare aluminum near the bottom that's going to be the kerosene tank, right? Because that's not as cold as the liquid oxygen tank above it?

Carolina Grossman - Astra Space - Director, Product Management

Yes. That's — right Thomas. So the liquid oxygen is that that top part, it's — it's very, very cold relative to the ambient temperature and that's why you get that you know, condensation on the outside similar to when you're drinking a cold beverage on a warm day. But this is just much, much colder.

Thomas Burghardt - NASA Space Flight - News Director

Right? And that's just the air around the rocket condensing. It's not actual material from inside the rocket getting out.

Carolina Grossman - Astra Space - Director, Product Management

That's right.

Thomas Burghardt - NASA Space Flight - News Director

Does that ice or frost that forms on the outside of the rocket affect the rocket's performance in any way? I mean does it have a significant amount of weight or create more drag?

Carolina Grossman - Astra Space - Director, Product Management

That actually will mostly fall off. And so it doesn't really impact our performance.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. Another question from Chat, asking, can the rocket engines be recovered from this rocket?

Carolina Grossman - Astra Space - Director, Product Management

Right. That's a great question. So at this time our rocket is in entirely single use so we don't recover any part of the vehicle. And the first stage including those engines will land back in the ocean.

And we are pursuing long-term options for sustainability of that approach. But the upper stage will de-orbit and burn up in the atmosphere but the first stage will land in the ocean. And landing from that altitude can be a pretty high-energy event. So we — even if we were to recover parts of the vehicle it may just be in small parts in the current way we operate.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. And a question from Mike on Chat, asking, where can I buy some Astra merchandise? Any extra merchs coming soon?

Carolina Grossman - Astra Space - Director, Product Management

Unfortunately the only way to get some cool Astra swag is to come work for us or to have a very close friend who does. So if you're interested in Astra merch, check out our careers page, at Astra.com.

Thomas Burghardt - NASA Space Flight - News Director

Nicely done. Very nice. Another question from Chat. This one's from Stephen, saying, since this is a dummy payload, with a payload fairing be deployed during today's flight?

Carolina Grossman - Astra Space - Director, Product Management

Yes. So fairing separation is part of our standard mission profile and because the fairings are pretty heavy and they add drag once we are in space, we will — we will deploy the fairings. I believe that happens — it happens right around the same time as stage separation. So a little closer to T zero, we'll be going through the mission profile.

Thomas Burghardt - NASA Space Flight - News Director

And that's actually a result of because Astra's rocket is a little unique in this aspect that it's not just the payload that's in the fairing. The fairing also encapsulates part of the upper stage so you have to separate it for the two stages to separate, right?

Carolina Grossman - Astra Space - Director, Product Management

Right. That's — that's correct. So the upper stage actually extends part of the way into that fairing volume, in addition to the payload. And again tonight's flight has a test payload which will not be deployed but we will monitor with cameras and send a signal to simulate deployment of the payload.

Thomas Burghardt - NASA Space Flight - News Director

Again, if you have questions about today's launch, go ahead and tag us with @NASASpaceflight.

For an update on the countdown we're still holding at T minus 30 minutes. Teams are evaluating some upper stage systems on the rocket. We'll have more information — we'll share more information as soon as we have it.

In the meantime, let's go ahead and listen back into the pad and mics and the countdown [then] and we'll come back with another update as soon as we have it.

(PAUSE)

Thomas Burghardt - NASA Space Flight - News Director

And if you are still with us here, we're at T minus 30 minutes. And if you're just joining us, we've been holding for a little bit as teams evaluated an upper stage system. We are getting word now that teams are getting close to resuming the countdown so we're going to keep listening in to the countdown [then], for them to make that call out and we'll have a new T zero shortly for today's launch attempt.

Again, if you're just joining us. We are getting close to resuming the countdown and releasing this hold. So stay tuned and we're going to listen in

(PAUSE)

Chris Hofmann - Astra Space - Flight Director, FLIGHT

This is Astra Flight on Countdown. The clock has resumed at T minus 30 minutes. We are picking back up the procedure at Step 106. At this time, FTS, please verify mission data load values are ready to be loaded onto the AFTU. Run [CASS] software as required.

Lucas Hundley - Astra Space - Flight Safety and Avionics, FTS

Mission data loads are loaded. [CASS] software is running on both AFTUs.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Copy. Thank you. Safety, please confirm you have all guests and Astra personnel accounted for at Launch Site Kodiak?

Lucas Hundley - Astra Space - Flight Safety and Avionics, FTS

Safety, can confirm all guests and safety team.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

And all personnel are in a safe location.

Lucas Hundley - Astra Space - Flight Safety and Avionics, FTS

Safety, can confirm.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

GNC, please confirm for me that we are still good on [calls] and blackouts for our current T zero time?

Dan Wilson - Astra Space - GNC/Trajectory

Confirmed. Still good on blackouts and [calls].

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Thank you. RCO, Flight on Countdown. At this time, Astra would like to request power on transmitter and enable [Tone A]?

Joshua Green - Astra Space - Controller, TANGO

This is RCO. [Confirmed].

(PAUSE)

Joshua Green - *Astra Space - Controller, TANGO*

FLIGHT, this is RCO. Carrier up. Tones up.

Chris Hofmann - *Astra Space - Flight Director, FLIGHT*

Copy. Thank you. Safety, please verify signal strength and good power up?

Lucas Hundley - *Astra Space - Flight Safety and Avionics, FTS*

Safety can confirm. Good signal strength and power up.

Chris Hofmann - *Astra Space - Flight Director, FLIGHT*

TANGO and AV1 Rocket Support [card]. Please enable the FTS.

Joshua Green - *Astra Space - Controller, TANGO*

AV1 Rocket Support [card], FTS enabled.

Chris Hofmann - *Astra Space - Flight Director, FLIGHT*

Safety, please verify FTS is enabled and nominal, at this time.

Lucas Hundley - *Astra Space - Flight Safety and Avionics, FTS*

Safety can confirm.

Chris Hofmann - *Astra Space - Flight Director, FLIGHT*

RCO Flight on Countdown, Astra FTS is enabled on the vehicle currently.

Joshua Green - *Astra Space - Controller, TANGO*

This is RCO. Copy.

Thomas Burghardt - *NASA Space Flight - News Director*

And as you can see, we have resumed the countdown. We're now at T minus 28 minutes and counting. And we have a new T zero of 11:10 p.m. Pacific Time. Teams have successfully evaluated the upper stage issue and have decided to proceed with the countdown.

Exciting news for today's launch attempt. In the meantime as we get closer to the business end of the countdown, let's dive back into some questions here. And the first one from Chat, it asks —from Conner, asking what kind of or how much simulation work takes place before our flight.

Carolina Grossman - Astra Space - Director, Product Management

That's a great question. We do a lot of simulation work both in preparing and getting our software systems for testing. But actually one of the things that is happening right now, a little bit more behind the scenes, is we are sending a weather balloon up to get the latest weather data and winds.

We've been tracking some upper level winds and potential wind-shear issues. So within the next few minutes we should have some more weather data that we will run simulations on while the countdown is happening and incorporate that information into our launch decision tonight.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. Another question, this one from Mustang, says, you guys by any chance have a flight computer that takes over the countdown at some point.

Carolina Grossman - Astra Space - Director, Product Management

Yes. One of — one of the most exciting things to hear during the countdown around — at 60 seconds is the call out, “vehicles, on internal control.” So we have one of our positions in Mission Control is TANGO.

That's the human vehicle controller who's — who's commanding the vehicle. And at that point the vehicle takes on its own — its own control and our flight software and guidance algorithms run to keep it on course towards orbit.

Thomas Burghardt - NASA Space Flight - News Director

A question from — a couple of questions in Chat about today's launch site. We've been talking about Kodiak Island, Alaska as the home for this Test Campaign. And for those of you who may just be joining in, why does Astra launch from Alaska?

Carolina Grossman - Astra Space - Director, Product Management

Yes. We have launched from Alaska for many of our launch attempts so far. And one of — some of the reasons that we enjoy working with our partners in the Pacific Spaceport Complex, Alaska, and the Alaska Aerospace Corporation, is that not too many other folks are launching out of Alaska right now. And so it helps us get availability.

It also helps us reach the — some of the orbits that are our customers will want to go to, Kodiak is great for reaching high inclination and polar orbits. And we have really enjoyed partnering with the range there.

It's also a great — very scenic launch site, although at night, it's a — it's a little hard to see what there's some lovely mountains and it's right over the ocean which of course is paramount for keeping the rocket away from populated areas and keeping all of our operations safe.

Thomas Burghardt - NASA Space Flight - News Director

I'm personally hoping that in just over 25 minutes here, we get some rocket exhaust to light up and maybe we'll get some more of that Kodiak landscape visible. Another question here relating to Kodiak. Do you guys have any problems with bears on Kodiak Island?

Carolina Grossman - Astra Space - Director, Product Management

There's quite a lot of wildlife in Kodiak. Thankfully, we haven't in the past had any problems with bears. But actually as we've been preparing this vehicle for launch we've had a little fox friend who has been spending some time around the launch pad over the last couple of weeks.

Luckily usually animals will sense the vibrations of the vehicle and keep well away. And so our fox friend is nowhere nearby and we work very closely with Range to keep everything safe during our launch operations.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. Another question, will Astra launch from somewhere other than Alaska, going forward?

Carolina Grossman - Astra Space - Director, Product Management

Yes. Our future plans definitely include a number of launch sites around the globe for our — for many space ports but tonight our focus and our eyes are on — are on Alaska.

Thomas Burghardt - NASA Space Flight - News Director

All right, T minus 24 minutes and counting. Again we're targeting a new T zero of 11:10 p.m. Pacific Time. And we have some questions about the launch window today. Does launching at night as opposed to during the day help or affect the rocket's path to space? Asks, Ethan.

Carolina Grossman - Astra Space - Director, Product Management

No. It — is all the same as far as — as far as the trajectory of the vehicle is concerned. Some of the differences are that it can be more visible from further away on a — on a clear night because it's — it's more — the plume is more distinct — visually distinct.

And some of the other differences in launching as night, as right now being November, in Kodiak it's — it's been quite cold. So we have had to change our procedures to operate differently in cold weather from our usually warmer launch attempts during the day.

Thomas Burghardt - NASA Space Flight - News Director

Interesting. And another question we're getting lunch windows. If today has to end in a scrub — and again we are back counting at T minus 23 minutes and so — not talking about that just yet. But are there other alternate launch windows for this launch campaign?

Carolina Grossman - Astra Space - Director, Product Management

Yes. We do have another opportunity tomorrow as well to launch if we are not successful in our launch tonight. But so far everything is looking good. And proceeding according to plan. Just waiting on some of that that weather data for the final, go, no-go.

Thomas Burghardt - NASA Space Flight - News Director

Sounds good. And another question here from Jon, asking, while the rocket is not reusable, how reusable is the launch arm, that ground equipment we see next to it?

Carolina Grossman - Astra Space - Director, Product Management

Yes. So the ground support equipment you see, that black arm is the launcher. And then we have our launch mount underneath, is also a little harder to see but those are reusable.

Of course they can — they can sometimes take quite the beating from the intense heat and energy of a rocket launch. However we've built this system to be as robust as we can and even though it undergoes some repairs between flights, we have used this launcher on multiple flights and will continue to use it for future launches.

Thomas Burghardt - NASA Space Flight - News Director

But we're talking about some different components of the rockets and things like that. We actually have a graphic to show the different components of a Rocket 3.0, an actual Rocket 3.0. Can you tell us what we're looking at and all the different sections we see here?

Carolina Grossman - Astra Space - Director, Product Management

Yes. I love this graphic. This is fun. So we'll start — we'll start from the left which is the bottom end of the rocket and we'll — we'll work our way up to the right.

So the first section you see on the left is the engine bay and you can kind of see peeking out 3 of our 5 Delphin first stage engines. So those each produce 6,500 pounds of thrust. And they are electric pump-fed engine. So the engine bay contains those pumps, the batteries that power them, and the connections to the first stage system.

So the next the largest section, that's our first stage. Our first stage which is — consists of a LOX tank, the liquid oxygen tank at the top. And then the fuel tank at the bottom which is RPX, essentially a form of kerosene.

Then continuing to move to the right the kind of cone-shaped segment that is what we call the inner stage. And that essentially is the housing for a lot of our avionics. The upper stage engine and that long, nozzle extension piece fit inside the inner stage.

And then moving up to the final section, you see the long, black nozzle of our upper stage Aether engine, which is a pressure-fed engine also powered by LOX and RPX which produces 740 pounds of thrust.

Then the 2 spheres, those are upper stage tanks. And then on top you can see our payload adapter plate which will have a payload on top. Again for tonight's mission, we have a test payload that will not be deployed.

And finally, the two halves, kind of floating above and below the upper stage, those are the fairings. And we remove those to install the payload and then reinstall those two fairing halves together.

Thomas Burghardt - NASA Space Flight - News Director

There we go. As we go through the countdown we're under 20 minutes and counting now. We're are going to listen in to the countdown then as the teams are getting through some milestones as we get closer to launch — for launch.

Dan Wilson - Astra Space - GNC/Trajectory

Stand by on that, FLIGHT?

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Understood.

(PAUSE)

Chris Hofmann - Astra Space - Flight Director, FLIGHT

As GNC evaluates we're going to finish out our igniter checks at Step 134. TANGO, please, on the buttons interface toggle Spark for 30 seconds?

Joshua Green - Astra Space - Controller, TANGO

Copy. Spark coming on in three, two, one.

(PAUSE)

Joshua Green - Astra Space - Controller, TANGO

Spark off.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Delphin, please confirm results?

Joshua Green - Astra Space - Controller, TANGO

Spark current looks nominal. However can I request an additional Spark check after [purchase]?

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Copy that. TANGO, can you please run an igniter purge for 2 seconds, on all 5 igniters?

Joshua Green - Astra Space - Controller, TANGO

(Inaudible).

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Starting with Alpha. Working at Echo.

(PAUSE)

Carolina Grossman - Astra Space - Director, Product Management

And as we're now approaching a T minus 17 minutes to launch, one of the next things that we'll see is a test of our water...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

(inaudible)...

Carolina Grossman - Astra Space - Director, Product Management

... deluge system...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

... Start Spark.

Carolina Grossman - Astra Space - Director, Product Management

...in the next couple...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Go ahead.

Carolina Grossman - Astra Space - Director, Product Management

... of minutes.

Joshua Green - Astra Space - Controller, TANGO

Spark on.

(PAUSE)

Joshua Green - Astra Space - Controller, TANGO

Spark off.

(PAUSE)

Carolina Grossman - Astra Space - Director, Product Management

And we are just — we just crossed that T minus 15 minute mark. We are expecting to potentially be in a hold for a few minutes as we wait for wind data. That's probably the reason why the deluge the water system test has been held off for a little while.

Thomas Burghardt - NASA Space Flight - News Director

We're going to keep listening in to the countdown [then]. And we will have more updates for you as soon as we have them.

(PAUSE)

Carolina Grossman - Astra Space - Director, Product Management

All right and we are holding at T minus 13 minutes and 47 seconds as we look at that wind data.

We are looking at potentially a 10 minute hold.

(PAUSE)

Thomas Burghardt - NASA Space Flight - News Director

And as you've seen, we are still in a hold right now at T minus 13 minutes, 47 seconds. The teams are waiting for some wind...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

(inaudible) shutdown.

Thomas Burghardt - NASA Space Flight - News Director

... data.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

(inaudible)...

Thomas Burghardt - NASA Space Flight - News Director

In the...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

... (inaudible)...

Thomas Burghardt - NASA Space Flight - News Director

... meantime we think...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

... (inaudible). Burghardt might be about a 10 minute hold or so.

Thomas Burghardt - NASA Space Flight - News Director

We'll take some...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

... (inaudible) confirm (inaudible).

Thomas Burghardt - NASA Space Flight - News Director

... questions in...

Chris Hofmann - Astra Space - Flight Director, FLIGHT

(inaudible)...

Thomas Burghardt - NASA Space Flight - News Director

... the meantime.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

... (inaudible).

Thomas Burghardt - NASA Space Flight - News Director

We got one here asking about the upper stage engine. Carolina, is it the same as the sea level engine or whether just a more vacuum optimized nozzle? Or is it a completely different engine?

Carolina Grossman - Astra Space - Director, Product Management

They're pretty different. The first stage engine, the Delphin engine, and the upper stage Aether engine, are pretty different from one another. So I know it's pretty common for upper stage engines to be slightly modified versions of the boost stage engines but in our case they're — they're pretty different.

Thomas Burghardt - NASA Space Flight - News Director

Next question asked, where is Mission Control located for this launch? Is it in Kodiak?

Carolina Grossman - Astra Space - Director, Product Management

Our Mission Control is actually here in Alameda, California, which is our headquarters. And it's one of the things that that keeps us as nimble as possible.

There you see the mission control camera that's — that's right behind — right behind where we're coming to you from. So we send a very small team up to Alaska with the vehicle and we keep most of our team here back at headquarters.

Thomas Burghardt - NASA Space Flight - News Director

And this is of course the headquarters building where the rocket is also built correct?

Carolina Grossman - Astra Space - Director, Product Management

That's right. We — here at our Campus in Alameda, we build and we do a lot of our engine testing as well. And it helps us stay fast to do everything — as much as we can under one roof.

Thomas Burghardt - NASA Space Flight - News Director

How long does it take for the rocket to get from the factory here in Alameda to Kodiak for example for launch?

Carolina Grossman - Astra Space - Director, Product Management

Yes. So that can — that can depend on the mode of transportation. And it also depends on the shipping schedule and what boat we can make. But it generally takes about a week for all of our equipment to make it from Alameda over road and boat to Alaska.

But a lot of our equipment can actually be flown for maximum speed, and in which case it can be there in a matter of hours.

Thomas Burghardt - NASA Space Flight - News Director

Another question from Chat, asking if this launch is successful, what is next for Astra?

Carolina Grossman - Astra Space - Director, Product Management

Well hopefully more launches but we'll — we'll keep our eyes focused on tonight's launch of LV0007. And you can follow us on Twitter @Astra or visit our website for more information from our blog posts, press releases, and SEC filings, for more information on Astra's future plans.

Thomas Burghardt - NASA Space Flight - News Director

Next question, asking if the ground team — well, we just look at Mission Control a little of a second ago, does the ground team have any control of the vehicle after launch other than FTS activation?

Carolina Grossman - Astra Space - Director, Product Management

Right. Our vehicle — once it launches, is being flown by itself, by the algorithms developed by our flight software and our guidance teams. So aside from our Flight Safety Systems which we will use in the event that the rocket is off course, everything after launch is being done by the vehicle itself.

Thomas Burghardt - NASA Space Flight - News Director

Our next question asking, how does Astra tackle water noise suppression?

Carolina Grossman - Astra Space - Director, Product Management

Yes. So one of the things that you — will usually see — and in I think we saw a smaller version of it while we were just going through some of these questions. The — it's a — it's a bit hard to see but we do have a water system around the base of our rocket, that is primarily for fire suppression but it also serves the — a purpose of noise suppression as well.

So we do have a water system there to make sure that we don't light anything that we're not supposed to be lighting after launch.

Thomas Burghardt - NASA Space Flight - News Director

Gotcha. Anyhow, we might have caught a glimpse of that as we're getting in the area of the camp where they do a deluge test. So we're — again we're still in a hole right now, 13 minutes, 47 seconds is where the countdown clock is. And we're waiting for another update.

We're waiting on wind data primarily, as making sure the winds are acceptable for launch. So we're going through some questions in the meantime. And the next question is from, Alex, asking, wouldn't it be easier to get to orbit if you launched closer to the equator?

Carolina Grossman - Astra Space - Director, Product Management

Yes. Launch sites generally help determine which kind of orbits the payload can reach as well. And in the case of launching from Kodiak, many higher inclination and polar orbits are actually easier to reach than launching from the Equator. And so the choice of launch site has to do with the mission itself as well.

Thomas Burghardt - NASA Space Flight - News Director

Next question from Matthew, asking, what is the launch trajectory of this rocket?

Carolina Grossman - Astra Space - Director, Product Management

I think we've got a map to show what the launch trajectory is. So we'll fly out south over the Pacific Ocean. And you can see that — we'll — see that trajectory once the rocket clears the path.

Thomas Burghardt - NASA Space Flight - News Director

And the next question, because all flights have happened from Alaska, this one, we just saw it on the map there, do they take these strongback and the other GSE equipment? So when we talk about GSE, ground support equipment, all the things around the rocket, you see on your screen right now, do those get taken apart and shipped back to the headquarters between every launch?

Carolina Grossman - Astra Space - Director, Product Management

Yes. Actually we don't leave much behind up in — up in Kodiak. And so we do ship pretty much everything back here to Alameda and we perform maintenance and repairs. Again that launcher system, the strongback and launch tool that you see, as well as some of these other shipping containers that you may see at the bottom of the screen, that will all come back to Alameda for repairs and maintenance.

Thomas Burghardt - NASA Space Flight - News Director

The next question from Chat. Here's a good one. Who is the guy with the smiley face on the back of his computer monitor?

Carolina Grossman - Astra Space - Director, Product Management

Well you can see on the right-hand side of your screen those googly eyes on that monitor, that is our Flight Activities Officer, Thomas Arend. And some of the questions we've gotten or you know, what's the — what's the story behind the googly eyes? And it's more of a, why not, kind of a — kind of situation? There was a big box of googly eyes around the office one day and quite a few things got some — got some eyeballs there.

Thomas Burghardt - NASA Space Flight - News Director

All right. If you're just joining us. We're in a hold right now. The — teams here in Mission Control at Alameda are looking at wind data and making sure that that is acceptable for launch. We're standing by for a new target T zero time.

In the meantime if you have questions please tag us at NASASpaceflight on Chat. We're going to keep going with those once we have some more questions coming in. In the meantime, let's go ahead and listen back into the countdown [then], and the microphones out of the pad, while we wait for some more information on this hold.

(PAUSE)

Carolina Grossman - Astra Space - Director, Product Management

And we are still in a hold at T minus 13 minutes and 47 seconds. But we've just gotten word that the weather data that we were waiting on is looking favorable. And we expect to be resuming the countdown any moment now.

So thanks for — thanks for sticking with us through this — through this hold. But we are hoping that we will be out of it soon and on our way to orbit shortly.

(PAUSE)

Chris Hofmann - Astra Space - Flight Director, FLIGHT

This is Flight on Countdown, entering Terminal Count at procedure Step 141, at this time. TANGO is and AV1 Managed Power Systems, please ensure Guidance Power System Authority is toggled off?

Joshua Green - Astra Space - Controller, TANGO

Confirm. Guidance System Power Authority is off.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

And AV1, turn ON/OFF [PDBs]. Please run a GNC self-test. GNC call out [when] complete.

Dan Wilson - Astra Space - GNC/Trajectory

GNC self-test, started.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

FTS, please confirm after FTS is still enabled on the vehicle?

Lucas Hundley - Astra Space - Flight Safety and Avionics, FTS

FTS is still enabled on the vehicle.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

TANGO, [in fuel for operate], toggle full?

Joshua Green - Astra Space - Controller, TANGO

[In fuel for operate], full.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

GNC, we have entered the Terminal Count. We're at T minus 14 minutes and 33 seconds and counting. The new T zero is 11:25 p.m., Pacific Time.

Thomas Burghardt - NASA Space Flight - News Director

Now that we are into the Terminal Count. We're going to look at an overview of the flight profile and what we'll expect to see once we have liftoff here from Kodiak. Carolina?

Carolina Grossman - Astra Space - Director, Product Management

Sure. So we'll start from the bottom and work our way up with that mission timeline. A few seconds before T zero, the engines will ignite. If all is good, we will send a signal to the hold down release mechanisms on that launcher system to release the rocket. And we will have liftoff at T zero.

Just a few seconds later, we will pitch over the rocket. And then our next objective is Max Q at 1 minute and 10 seconds. Following Max Q, which is the point of maximum aerodynamic pressure on the vehicle, we'll be looking for main engine cutoff or MECO, at 2 minutes and 50 seconds.

And then a few things happen in pretty quick succession — succession, which is, fairing separation, stage separation, and then the upper stage Aether engine will light at 3 minutes and 5 seconds. If we meet all of those things, then we'll be in space. And it will be very exciting. And then the Aether engine will burn for a little over 5 minutes before a second engine cutoff or ASECO.

And our final step in the mission will be to send a signal to simulate payload deployment. Again, we have a test payload on this flight which will not be deployed but we will monitor to see if the signal to simulate the deployment is successful at 8 minutes and 40 seconds.

Again our objective today is to reach orbit, and successfully complete all of these steps on our mission timeline.

Thomas Burghardt - NASA Space Flight - News Director

Yes. And so what is coming up next. We are at T minus 12 1/2 minutes and counting. We are coming up on the next big milestone which is the go/no-go, poll for launch. So we're going to listen in to the countdown [then], as the teams get up to that and poll go/no-go for launch.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

(inaudible) deactivate fuel for operate?

Joshua Green - Astra Space - Controller, TANGO

Fuel for operate, deactivated.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Fuel 3 supply?

Joshua Green - Astra Space - Controller, TANGO

Deactivated.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Fuel 1, FE 300 upper fill?

Joshua Green - Astra Space - Controller, TANGO

Deactivated.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Fuel 1 FE 200 first fill?

Joshua Green - Astra Space - Controller, TANGO

Deactivated.

Chris Hofmann - Astra Space - Flight Director, FLIGHT

AV1, radios?

Joshua Green - Astra Space - Controller, TANGO

AV1 radios, deactivated

Chris Hofmann - Astra Space - Flight Director, FLIGHT

AV1 Rocket Support [card]?

Joshua Green - Astra Space - Controller, TANGO

AV1 Rocket Support [cart], deactivated.

(PAUSE)

Chris Hofmann - Astra Space - Flight Director, FLIGHT

Flight on Countdown, Astra is scrubbing at this time.

Carolina Grossman - Astra Space - Director, Product Management

And as you've just heard, unfortunately with just a few minutes left in our — in our countdown for this evening, we unfortunately need to scrub tonight's launch attempt. We'll provide more information as we — as we can share the cause of that scrub.

But the good news is that we have another opportunity to launch tomorrow. So please join us again at the same time tomorrow, nominal T zero time would be 9:00 p.m., Pacific Time, with the live stream beginning at T minus 60 minutes.

Thomas Burghardt - NASA Space Flight - News Director

Yes. From Astra Space Flight, a big thank you to Astra for trusting us to help them with this broadcast. And again helping them with some of the expenses related to making this happen.

We will again be live hopefully for another launch attempt tomorrow. But we are scrubbing tonight's attempt. Just a couple of minutes left in the count but unfortunately today's launch attempt has scrubbed. And our next attempt is tomorrow.

For everyone who tuned in, thank you so much for watching. Thank you so much for all the questions and Chat, and all the support that was sent in. We really do appreciate it. We hope you'll come out and join us tomorrow for another launch attempt.

Thomas Burghardt for NASASpaceflight and Carolina Grossman for Astra. Carolina, thanks for joining me tonight.

Carolina Grossman - Astra Space - Director, Product Management

Thanks, Thomas. Have a good night.

Thomas Burghardt - NASA Space Flight - News Director

All right. Well hopefully be back tomorrow. Everyone, thanks for tuning in. And we'll see you next time.

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Astra Reaches Orbit

United States Space Force test payload reaches precise orbit in under ten minutes

Alameda, CA. November 22, 2021. Astra Space, Inc. (“Astra”) (Nasdaq: ASTR), successfully completed its first commercial orbital launch for the United States Space Force late Friday night, November 19, 2021, PST. The launch, STP-27AD2, was conducted from Astra’s Kodiak Spaceport, located at the Pacific Spaceport Complex in Kodiak, Alaska.

Astra’s launch system successfully demonstrated the orbital placement of a test payload to an inclination of 86.0 degrees at an altitude of 500 km. The payload achieved an orbital velocity of 7.61 kilometers per second in 8 minutes and 47 seconds.

“Reaching orbit is a historic milestone for Astra,” said Chris Kemp, Founder, Chairman and CEO of Astra. “We can now focus on delivering for our customers and scaling up rocket production and launch cadence.”

The United States Space Force contracted this launch through a Defense Innovation Unit Other Transaction Agreement.

Astra was founded in 2016 to launch a new generation of space services enabled by large constellations of small satellites in Low Earth Orbit. The team set out to design a rocket that could be mass produced like an automobile, and a launch system that could deliver payloads into orbit from spaceports everywhere, inspired by the opportunity to provide daily access to space. In just five years, Astra successfully “learned its way” to orbit, launch by launch, increasing capabilities and operational efficiencies with each iteration.

“We owe this success to our incredible team and the culture we’ve built at Astra.” said Adam London, Co-Founder and CTO of Astra. “I’m humbled by their courage and commitment to keep building, launching, learning, and iterating until we succeeded.”

About Astra

Astra’s mission is to improve life on Earth from space by creating a healthier and more connected planet. Today, Astra offers the one of the lowest cost-per-launch dedicated orbital launch service of any operational launch provider in the world. Astra completed its first commercial orbital launch in November 2021, making it one of the fastest U.S. company in history to reach this milestone. Astra is based in Alameda, California, and was founded in 2016. Astra (NASDAQ: ASTR) was the first space launch company to be publicly traded on Nasdaq. Visit www.astra.com to learn more about Astra.

Safe Harbor Statement

Certain statements made in this press release are “forward-looking statements”. Forward-looking statements may be identified by the use of words such as “anticipate”, “believe”, “expect”, “estimate”, “plan”, “outlook”, and “project” and other similar expressions that predict or indicate future events or trends or that are not statements of historical matters. These forward-looking statements reflect the current analysis of existing information and are subject to various risks and uncertainties, including Astra’s failure to meet the projected launch targets. As a result, caution must be exercised in relying on forward-looking statements. Due to known and unknown risks, actual results may differ materially from Astra’s expectations or projections including the following factors, among others: (i) projected development and launch targets, including as a result of the decisions of governmental authorities or other third parties not within our control, weather and other suboptimal conditions that may make it difficult to

perform a launch attempt; (ii) changes in applicable laws or regulations; (iii) the ability of Astra to meet its financial and strategic goals, due to, among other things, competition; (iv) the ability of Astra to pursue a growth strategy and manage growth profitability; (v) the possibility that Astra may be adversely affected by other economic, business, and/or competitive factors; (vi) the effect of the COVID-19 pandemic on Astra, (vii) the ability to manage its cash outflows during its pre-revenue business operations and (viii) other risks and uncertainties discussed from time to time in other reports and other public filings with the Securities and Exchange Commission by Astra.

When we use the phrase “commercial orbital launch,” we mean a launch conducted under a FAA Commercial Launch License.

Media Contact:

Kati Dahm

kati@astra.com

Investor Contact:

Dane Lewis

investors@astra.com