Filed Pursuant to Rule (424)(b)(3)
Registration No. 333-257930

PROSPECTUS SUPPLEMENT NO. 6
(to Prospectus dated August 12, 2021)

ASTRA SPACE, INC.

Primary Offering Of
15,333,303 Shares of Common Stock

Secondary Offering of
189,026,575 Shares of Common Stock
5,333,333 Warrants to Purchase Common Stock

This prospectus supplement amends and supplements the prospectus dated August 12, 2021 (as supplemented or amended from time to time, the "Prospectus"), which forms a part of our Registration Statement on Form S-1 (No. 333-257930). This prospectus supplement is being filed to update and supplement the information in the Prospectus with the information contained in our Current Report on Form 8-K, filed with the Securities and Exchange Commission on August 31, 2021 (the "Current Report"). Accordingly, we have attached the Current Report to this prospectus supplement.

The Prospectus and this prospectus supplement relate to the issuance by us of up to an aggregate of (i) 9,999,970 shares of our Class A common stock that may be issued upon exercise of warrants to purchase Class A common stock at an exercise price of $11.50 per share (the "public warrants") issued by Holicity Inc. ("Holicity") in its initial public offering; and (ii) 5,333,333 shares of our Class A common stock that may be issued upon exercise of private placement warrants at an exercise price of $11.50 per share that were originally sold to X-icity Holdings Corporation (the "Sponsor") in a private placement consummated simultaneously with Holicity's IPO (the "private placement warrants" and, together with the public warrants, the "warrants").

The Prospectus and this prospectus supplement also relate to the offer and sale, from time to time, by the selling securityholders named in this prospectus (the "Selling Securityholders"), or any of their permitted transferees, of (i) 5,333,333 private placement warrants; (ii) up to an aggregate of 5,333,333 shares of our Class A common stock that may be issued upon exercise of the private placement warrants held by the Selling Securityholders; (iii) up to an aggregate of 20,000,000 shares of our Class A common stock that were issued to certain investors (collectively, the "PIPE Investors") in a private placement in connection with the closing of the Business Combination (as defined herein); (iv) 7,500,000 shares of Class A common stock issued to the Sponsor prior to Holicity's initial public offering and registered for sale by the Selling Securityholders; (v) up to an aggregate of 92,277,793 shares of Class A common stock that were issued to certain affiliates of Astra (collectively, the "Astra Affiliates") pursuant to the Business Combination Agreement (as defined herein); (vi) up to an aggregate 56,239,188 shares of Class A common stock issuable upon conversion (on a one-for-one basis) of shares of our Class B common stock, par value $0.0001 per share ("Class B Common Stock") held by certain Selling Securityholders and (vii) up to an aggregate of 7,676,261 shares of our Class A common stock issued in connection with our acquisition of Apollo Fusion, Inc. ("Apollo Fusion"), which closed on July 1, 2021 comprised of (x) 2,558,744 shares of our Class A common stock (the "Initial Apollo Shares") issued to certain of the Selling Securityholders on July 1, 2021, in connection with our merger with Apollo Fusion, Inc. ("Apollo Fusion") and (y) 5,117,517 additional shares of our Class A common stock (the "Additional Apollo Shares") which may be issued to certain of the Selling Securityholders assuming (a) the achievement of all remaining performance milestones set forth in the Apollo Fusion Merger Agreement (as defined herein), (b) we elect to pay all future milestone consideration in shares of our Class A common stock as required by the terms the Apollo Fusion Merger Agreement, and (c) the per share price used to calculate the number of shares of our Class A common stock to be issued is $11.7243, which is the same per share price used to calculate the number of Initial Shares issued to the Selling Securityholders. The Additional Shares have not been earned and

are not currently outstanding. The actual number of Additional Shares issued to the selling stockholders could be materially greater or less than 5,117,517 shares of Class A common stock depending whether and to what extent the future performance milestones are met and/or the actual average closing price of our Class A common stock at the time such milestones are achieved. The Prospectus and this prospectus supplement also cover any additional securities that may become issuable by reason of share splits, share dividends or other similar transactions.

Our common stock and warrants are listed on Nasdaq under the symbols “ASTR” and “ASTRW”, respectively. On August 30, 2021, the closing price of our common stock was $9.49 per share and the closing price of our warrants was $2.67 per share.

This prospectus supplement updates and supplements the information in the Prospectus and is not complete without, and may not be delivered or utilized except in combination with, the Prospectus, including any amendments or supplements thereto. This prospectus supplement should be read in conjunction with the Prospectus and if there is any inconsistency between the information in the Prospectus and this prospectus supplement, you should rely on the information in this prospectus supplement.

Investing in our securities involves risks that are described in the *“Risk Factors”* section beginning on page 15 of the Prospectus.

Neither the SEC nor any state securities commission has approved or disapproved of the securities to be issued under the Prospectus or determined if the Prospectus or this prospectus supplement is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus supplement is August 31, 2021.

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): August 27, 2021

Astra Space, Inc.
(Exact name of Registrant as Specified in Its Charter)

Delaware	**001-39426**	**14-1916687**
(State or Other Jurisdiction of Incorporation)	**(Commission File Number)**	**(IRS Employer Identification No.)**
1900 Skyhawk Street Alameda, California		**94501**
(Address of Principal Executive Offices)		**(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 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.

As announced in our current report on Form 8-K filed with the Securities and Exchange Commission on August 31, 2021 (the "August 31 Form 8-K), we conducted two launch attempts for the United States Space Force on our launch vehicle, LV0006. The launch attempts occurred on August 27, 2021 and August 28, 2021, with the outcome of our second launch attempt announced in a press release filed with our August 31 Form 8-K.

Both launch attempts were also livestreamed through NASA Spaceflight. The video of these livestreams is available on our Twitter account (@astra), our Linkedin account (linkedin.com/company/astraspace) and our website at www.astra.com. We have also furnished transcripts of these videos as Exhbits 99.1 and 99.2 hereto.

These exhibits 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.

Item 9.01 Financial Statements and Exhibits.

(d) Exhibits

Exhibit No.	Description
99.1	Transcript of livestream video for launch attempt on August 27, 2021
99.2	Transcript of livestream video for launch attempt on August 28, 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: August 31, 2021

Astra Space, Inc.

By: /s/ Kelyn J. Brannon
Name: Kelyn J. Brannon
Title: Chief Financial Officer

Exhibit 99.1

08.27.2021

Thomas Burghardt (00:01:26):

Hello, everyone. Welcome to today's webcast of Launch Vehicle 6 or LV0006, Astra's third orbital launch attempt. Today's mission is a demonstration launch for Astra in partnership with the United States Space Force. The flight is taking place from Kodiak Island, Alaska, and we are coming to you live today from Astra's headquarters in Alameda, California, where teams in mission control are conducting the launch attempt.

Thomas Burghardt (00:01:48):

My name is Thomas Burghardt, News Director for NASASpaceFlight.com and one of your hosts for today's launch. I'm joined by Carolina Grossman, Director of Product Management at Astra. Carolina, how are things looking for today's launch?

Carolina Grossman (00:01:58):

Thanks, Thomas. We are just inside T-minus 50 minutes from launch. We are tracking upper-level winds, but our latest weather data looks good and the team has begun loading propellant onto the vehicle.

Thomas Burghardt (00:02:11):

That is excellent to hear, thanks, Carolina. As usual, throughout the course of our broadcast, we'll be taking your questions live, so if you have questions about what you're seeing, what's going on, please feel free to throw them in the chat and tag us with @NASASpaceFlight. We'll be getting through as many of those questions as we can over the course of the countdown and the launch, but really quick, we're going to take a look at the static fire tests, which led into today's launch campaign.

Chris Kemp (00:02:34):

The hot fire test is the final test of the entire integrated launch system, where we get to test every single component of the rocket.

Chris Kemp (00:02:52):

With every new version of the rocket, we perform a hot fire test that allows us to make sure that all of the upgrades work before we launch the rocket in space. Once we're done with this test, we pack up the rocket and Astra is on its way to orbit.

Thomas Burghardt (00:03:16):

So, as we mentioned, today's mission is a test flight for the United States Space Force and our first question is talking about the payload onboard today. So, Carolina, what is in that payload fairing for today's launch?

Carolina Grossman (00:04:04):

Absolutely, we have a payload from the US Space Force part of the space test program. It is a test payload, so we will not be deploying it on today's mission.

Thomas Burghardt (00:04:15):

Gotcha. And this is, of course, Astra's third orbital launch attempt, and I believe that makes today's flight the first Astra launch with an actual payload onboard?

Carolina Grossman (00:04:23):

That's right. This is our first commercial payload onboard an Astra rocket, which is very exciting.

Thomas Burghardt (00:04:30):

And I want to talk about where today's launch is lifting off from. We're looking at the beautiful launch site out in Kodiak, Alaska, which was also the home of the two prior Rocket 3 orbital launch attempts, correct?

Carolina Grossman (00:04:40):

Yes, that's right. Our scenic launchpad in Kodiak, Alaska is what you're looking at now on your screen. Kodiak is 250 miles south of Anchorage and is the second largest island in the United States, after the big island of Hawaii. You might be surprised, but the weather is actually not as cold there as you might think. Typically, highs are in the sixties and lows are in the fifties Fahrenheit this time of year.

Carolina Grossman (00:05:03):

Kodiak is the home of the Pacific Space Port Complex Alaska also known as PSCA, which first opened in 1998 and is a launching site for suborbital and orbital launch vehicles in the US. That's where LV6 will launch from today. And we'd like to take a moment now to thank all of the PSCA team for being an instrumental part of our launch and continuing to help us safely and efficiently operate in beautiful Kodiak.

Thomas Burghardt (00:05:27):

It is an absolutely gorgeous launch site, and we're getting treated to some beautiful views of today's launch. And like we said, we're just over 50 minutes away, we're currently targeting a liftoff of 2:00 PM Pacific time. And that is the opening of a window and as you can see on the screen one watch item we are looking at is winds, but I believe, right now, everything is tracking on time for launch, is that right?

Carolina Grossman (00:05:51):

That's right, so far we are moving smoothly through our countdown procedure.

Thomas Burghardt (00:05:55):

That is great to hear. You will also be hearing the countdown net as the launch controllers go through their various procedures. You'll hear that every once in a while. That'll give another update on how the countdown is progressing and as we look at mission control here in Alameda, I'll point out... Well, one of them has stepped out. I'll point out the launch conductor, which is Chris Hofmann and the Mohawk in the back row there, he will be joined on his right shortly by launch director, Chris Thompson. And that is the half a dozen or so folks here in launch control in Alameda, and they are joined by another crew that is similarly small out there in Kodiak, isn't that right?

Carolina Grossman (00:06:32):

That's right, we have our red team of six that's out there in Alaska. They do everything that we need to do to set up our whole launch site, prepare the rocket and it's been wonderful to have a very small and nimble team, especially as we continue to work through the COVID-19 pandemic. The team is working very hard to stay safe out there and we want to thank them for all that they do to help us operate so efficiently.

Thomas Burghardt (00:06:59):

We'll be able to see the teams hard at work today. And what we're also seeing now is the beginning of propellant load operations, just before the stream started, the teams polled go for propellant load, and you could see the rocket starting to get frosty on the outside. Let's talk a little bit about that. The Astra Rocket 3 series is fueled by kerosene and liquid oxygen. The kerosene is ambient temperature, which is why you're going to see that frost line kind of partway up the rocket there, not the entire rocket, because only the liquid oxygen tank, which is on top, is going to cause the air around the rocket to condense and you'll see that ice forming on the outside as we see with many, many launch vehicles that we've watched here at NASA Space Flight and as that frost progresses, we'll get that visual indicator of how fuel load is going. And that will continue until just a few minutes before launch.

Thomas Burghardt (00:07:46):

Diving back into some more questions here, we have one asking about potential future re-usability. I don't believe Astra is going to go that route, can you tell us a little bit about why, Carolina?

Carolina Grossman (00:07:56):

Right. We are focused on producing expendable rockets. There's a few reasons. One is just from a physics perspective, you have to carry extra mass to make a rocket that can withstand reusable flight and we also get economies of scale as we make more and more of the same type of rocket, since we can save that refurbishment cost. And finally, we designed our rocket as a small rocket that is not designed to be carrying people, we're sending payloads up into space, and so, we want to focus on making something as efficient and simple as possible. One of our values here at Astra is that simple scales, so we don't want to add a lot of mass and try and reuse things and build in that extra engineering work, so expendable design, we believe, is going to be the path to help us get up to scale.

Thomas Burghardt (00:08:48):

That's simple scale's philosophy is written all over the place here at the factory, you see it everywhere. And those simple, small launch vehicles that you can mass produce to the point where your serial number needs three zeros at the beginning of it, so you have room for all those future rockets.

Carolina Grossman (00:09:02):

Absolutely, we are hoping to provide daily space delivery someday, so those three zeros, we can't wait to have LV9999 under our belts.

Thomas Burghardt (00:09:40):

And we can see launch conductor, Chris Hoffman in the back row there and he is now joined by Chris Thompson to his right, our left. Those are your launch conductor and launch director for today's launch. As the countdown proceeds and we're going to let some more questions come into the queue here. In the meantime, let's listen in to the countdown net as the teams continue with the countdown.

Speaker 1 (00:10:14):

For FTS checkouts.

Thomas Burghardt (00:12:05):

Of course, right on cue as we go to the countdown, they get a little quiet as they continue to work through their procedures, but we're going to continue listening in to them throughout the countdown.

Thomas Burghardt (00:12:13):

In the meantime, we'll keep taking some questions, Carolina. And right now we're looking at Rocket 3.3, that version of Astra's rocket. Can you talk a little bit about how the previous versions of the rocket that we've seen fly before have been upgraded and changed to get to this version?

Carolina Grossman (00:12:28):

Absolutely, so this is our latest and greatest rocket. What we have done in the time since our last flight in December, we, first of all, fixed the issue that caused us to fall short of orbit, so that was an issue with our propellant mixture ratio. We've resolved that issue. We've also extended the first stage tanks in order to allow more propellant to load onto the vehicle so we can get more payload and we've also consolidated a lot of the components on the upper stage in order to, again, get more payload capability out of our rocket.

Thomas Burghardt (00:13:02):

And this is still a dedicated small launch vehicle and we've got a question in the chat asking if Astra has any plans for a bigger rocket after this?

Carolina Grossman (00:13:10):

Yes, our rockets may get a little bit bigger as we proceed and adjust our plans for our customers. We are, of course, looking to serve what our customers needs first and foremost, and we've made changes and continue to improve on our rocket. Our Rocket 2 was smaller than our Rocket 3, we increased the diameter and we'll continue to make small iterations. It's a big part of our philosophy at Astra to make iterative changes and improvements in order to best serve what our customers need.

Thomas Burghardt (00:13:45):

I believe it was a length change, right? That first [inaudible 00:13:47] got stretched a little bit-

Carolina Grossman (00:13:48):

Right, that's correct.

Thomas Burghardt (00:13:53):

Countdown is proceeding. I'm going to keep coming with some questions here. We have a question asking what material is the structure of the rocket made out of?

Carolina Grossman (00:13:59):

Yeah, most of the rocket that you see here is made out of really simple materials. We tend to shy away from things like carbon fiber and 3D printing as much as possible so that we can mass produce it and continue to scale. A lot of what you see comes in as sheets of metal into our factory and our incredibly talented machine shop team turns that into the vehicle that you see today.

Thomas Burghardt (00:14:25):

And we can see that bare aluminum on that first stage. It looks really, really cool. It's a cool looking rocket.

Carolina Grossman (00:14:31):

Absolutely. I'm a little biased, but I agree.

Thomas Burghardt (00:14:36):

So, we're looking at Kodiak right now and we have a question asking if there are other launch sites currently being considered, what kind of things does Astra look for in potential launch sites?

Carolina Grossman (00:14:45):

Yeah, again, we're looking to serve our customers and the needs that they have, but we are identifying new launch sites in the United States and that's what we can say about our plans right now.

Thomas Burghardt (00:14:58):

What kind of orbits are you able to access from Kodiak with this initial launch site?

Carolina Grossman (00:15:02):

Yeah, we're looking at high inclination orbits like sun synchronous orbit, which is a location that many of our customers want to go to.

Thomas Burghardt (00:15:10):

I know this particular flight is going towards a 70 degree inclination, so not quite polar, but a high inclination orbit, just going up to low-earth orbit, 415 kilometers altitude, and that'll be that target for, again, that mass simulator payload on the upper stage, which will not be deployed in any way, just a test payload to demonstrate Astra's orbital capability.

Carolina Grossman (00:15:30):

That's right.

Thomas Burghardt (00:15:33):

So, how did this rocket get up to Kodiak? We're here at the factory here in Alameda, California, and well, it's not super close to Kodiak, so how did that rocket get up there?

Carolina Grossman (00:15:42):

Yeah, one of, I think, the most unique things about Astra's launch system is that a lot of what you see on your screen fits inside standard shipping containers. So, if you joined us at the top of the broadcast, we had a video of our static fire test that showed this exact same material being deployed to our test site a couple of hours away from our headquarters. We literally load everything into shipping containers and truck it out and ship it out by boat to where it needs to go. It's something that allows us to be extremely responsive when we're setting up a test site or a launch site and one of the reasons why the Space Force was excited to work with us.

Thomas Burghardt (00:16:18):

And that rocket, all the hardware that goes around it and the red team, which travels up to the launch site with the rocket, arrived there just a week before this launch attempt, right?

Carolina Grossman (00:16:28):

Right, just about. It is a very precise orchestration of getting everything set up, but we are able to do it very quickly.

Thomas Burghardt (00:16:38):

And that's part of not only the simple scale's philosophy where you want to keep your launch teams and the hardware involved as simple as possible, but also the ability to launch from anywhere, or at least anywhere with a concrete pad and an internet connection, right?

Carolina Grossman (00:16:52):

That's right.

Thomas Burghardt (00:16:53):

And as well as that quick launch turnaround, because again, if Astra's going to one day achieve that daily launch cadence, you don't want to be out on the pad for weeks at a time.

Carolina Grossman (00:17:02):

Right. We think that it gives us an ability to be very responsive, both in terms of timing between launches and helping us to accelerate our cadence, as well as the locations that we're able to fly out of.

Thomas Burghardt (00:17:15):

So, another question we're having here, we're talking about the simple infrastructure around the rocket, but is there still a water deluge system that we're going to see near liftoff?

Carolina Grossman (00:17:24):

Yes, absolutely. Just about 15 minutes before T zero, we will perform a test of the deluge system and you'll see that very beautiful spray of water come out from near the base of the rocket, which is a nice indicator that we are approaching our terminal count.

Thomas Burghardt (00:17:41):

And I know that seeing some of the current tests we saw that static fire video, we've seen video from prior launches and that water deluge system is dramatic and very visible, so we'll definitely be keeping an eye out for that.

Thomas Burghardt (00:17:52):

Keep your questions coming, again, tag us with @NASASpaceFlight, if you have more questions for us in chat in the meantime, let's go ahead and listen back into the countdown and as the countdown proceeds. And joining me now is Dr. Adam London, co-founder and CTO of Astra. Adam, thank you so much for taking some time to join us today.

Adam London (00:20:18):

Happy to be here. Exciting day.

Thomas Burghardt (00:20:19):

So, how are you feeling about today's launch attempt?

Adam London (00:20:23):

We're excited. We're ready to do this and spend a lot of time getting our rocket ready and now's the time to see how it goes.

Thomas Burghardt (00:20:31):

So what are your responsibilities here as the CTO of Astra?

Adam London (00:20:34):

I lead sort of the overall technical decision and architecture of the vehicle and also help work on advanced technologies.

Thomas Burghardt (00:20:43):

And talk about some of those upgrades, we're coming through Rocket 3.3, first launch of this version of the rocket and there's been some upgrades since 3.2. Can you talk a little bit about what's changed for this launch?

Adam London (00:20:53):

Sure, our first focus was making sure that we understood and fix the issues that caused the previous rocket to not quite make orbit. And so, we've addressed the fuel consumption and mixture ratio control situations. That was one thing. But, in addition, we made a number of other improvements, including lengthening the rocket a little bit, so it's about five feet longer than the previous one, as well as improving the performance of the upper stage.

Thomas Burghardt (00:21:26):

And how do you balance making those kind of upgrades and tweaks when you learn from every single flight when you have several rockets in various stages of production at any one time?

Adam London (00:21:35):

It's tricky, but ultimately our goal is to build batches. And so, the next rocket LV0007 is on the floor over here getting built and if this rocket goes well, it will be an identical copy. If, from this rocket, we learn things that make us want to change a few things, we'll make some small changes in it and continue moving along in that direction.

Thomas Burghardt (00:21:58):

And how is Astra currently working today? Do you transition not just between launches and learning from every single flight, but also transitioning towards your future rockets, maybe scaling it up to larger payload capabilities or bringing down launch cadence times so you can eventually achieve that daily launch cadence?

Adam London (00:22:14):

Yeah. A lot of what we're doing now is thinking about production. And so, the Rocket 3 series will be the one that we first produced at rate and so 0007 will be next and then 0008, 0009. In that process, we'll be learning and taking those learnings to apply them to future improvements of the rocket.

Thomas Burghardt (00:22:34):

I'm going to take a question here from chat here, they want to ask Dr. London, what is the most fun part of rocket design, because I know you have some very interesting rocket design programs in your history?

Adam London (00:22:46):

The most fun part is always watching the rocket's light, either the engines in the test cell or the rocket as it's getting ready to leave the pad.

Thomas Burghardt (00:22:56):

And lastly, I want to ask you one last question before we let you go on launch day here. Thank you so much for joining our sort of pre-launch, pregame interview. Once we are getting close to T zero, what are you going to be doing, where are you going to be watching the launch from?

Adam London (00:23:09):

Well, once we get to T zero, there's not much we can do, the rocket flies itself. And so, I'll be sitting there with the rest of the team, enjoying the video and watching the data to see how it performs.

Thomas Burghardt (00:23:20):

Adam, thank you so much for joining us. We're all looking very much forward to this launch and best of luck to you and the teams and yeah, thanks so much for taking some time with us today.

Adam London (00:23:28):

Thanks for being here and looking forward to seeing this flight.

Thomas Burghardt (00:23:32):

All right, let's listen back into the countdown and as the countdown proceeds past T-minus 33 minutes and counting. And Carolina, let's talk a little bit about why that countdown is a little quiet right now. Sounds like things just might be going really smoothly?

Carolina Grossman (00:25:49):

Yes, we are at T-minus 31 minutes now and things appear to be proceeding nominally.

Thomas Burghardt (00:25:55):

We always love to hear things are going nominally. We'll keep listening in every once in a while, but sometimes a quiet countdown is a good countdown, meaning the teams are talking on other nets to resolve any minor things, but sounds like no major issues being worked at this time.

Carolina Grossman (00:26:08):

That's right. No news is good news at the moment.

Thomas Burghardt (00:26:10):

Absolutely. We're coming up on the T-minus 30 minute mark again, if you're just joining us, liftoff is targeted currently for 2:00 PM Pacific time, and we'll give you any updates if that changes, but so far, the countdown proceeding nominally, and we're going to keep going through some questions in chat, so if you have more of those questions, throw them in the chat, tag us with @NASASpaceFlight and we're going to keep answering those as best we can. So, let's talk a little bit about how far away launch control is from the launch pad, the pad up in Kodiak, Alaska?

Carolina Grossman (00:26:38):

Well, you can see the pad is in Kodiak, Alaska and our launch control is right behind us here in our headquarters in Alameda, so it is very, very far away. We have our team at Kodiak, the red team that helps to set up and prepare everything for launch on site. They have fallen back to a safe distance from the pad, but our launch control is entirely here in Alameda. We have our mission control camera that you've been seeing and we also have the team of engineers who has worked on the system and is looking at data dispersed throughout our factory.

Thomas Burghardt (00:27:13):

And that red team, which has backed away from the launch side, obviously now that we're into propellant load, is not actively controlling the launch then, that's all on the people sitting behind us here in California?

Carolina Grossman (00:27:22):

Right, the vehicle is entirely controlled from our launch control here in Alameda.

Thomas Burghardt (00:27:31):

And then, here in Alameda is not just mission control, we're in the middle of a giant factory space, does all of the manufacturing still happen here in California?

Carolina Grossman (00:27:40):

Yes, actually all of our manufacturing still happens here at our headquarters in Alameda and we also do a bunch of our engine testing here on site as well. It's pretty amazing to see an engine built on a bench top and rolled over to our test facility, literally across the road on the stand and fired off in the same day.

Thomas Burghardt (00:28:02):

We definitely appreciate the-

PART 1 OF 4 ENDS [00:28:04]

Carolina Grossman (00:28:03):

... In the same day.

Thomas Burkhardt (00:28:03):

We definitely appreciate the opportunity to get a tour of those factory and test facilities last week prior to this launch campaign. We're looking forward to sharing that on the NASASpaceflight channel. So stay tuned for that on NASASpaceFlight, on YouTube.

Thomas Burkhardt (00:28:16):

In the meantime, 28 minutes and counting, teams continuing to count down towards the launch of launch vehicle 0006, Astra's third orbital launch attempt. I want to talk a little bit about the teams that have built this rocket, tested this rocket, and are now conducting the launch attempt.

Thomas Burkhardt (00:28:32):

While around here in Alameda, we've seen a lot of people coming from a lot of different backgrounds, even at the high VP level. There's a lot of people coming with maybe not even aerospace experience, coming from a lot of different industries. Can you talk a little bit about how that makes Astra a bit of a different rocket company?

Carolina Grossman (00:28:46):

Yeah, absolutely. We're here in the San Francisco Bay Area, which is not a typical place where you find a lot of rocket manufacturers. So we like to take advantage and try and think differently as we're trying to build a rocket in a way that no one has ever built one before. So we do have a lot of folks who come from Silicon Valley companies. We have folks from the automotive industry. We really value that diversity of thinking as we try and build differently.

Thomas Burkhardt (00:29:14):

We have a question in the chat about someone who may be potentially looking to join that team. Wondering if Astra has an intern program.

Carolina Grossman (00:29:20):

Yes, we do love having interns here at Astra. You can learn more at our careers page on the Astra website. But as our summer's wrapping up, we've had a wonderful group of interns that have just wrapped up their summers, and we hope to welcome many of them back.

Thomas Burkhardt (00:29:38):

Excellent. Another question in the chat again, we are targeting a lift off time of 2:00 PM, Pacific Time, but a question asking how long does that launch window remain open for? Because that's just the opening of today's event.

Carolina Grossman (00:29:48):

Right. So for any reason, we have to scrub today's launch, we do have a launch window that extends through September 11th. So we have plenty of chances to try again. It's not an instantaneous window, so we'll have a few hours. But we do know that the wind is looking best at the beginning of our window. So, we're hoping to light that candle at the very start of our window.

Thomas Burkhardt (00:30:12):

Sounds good to me. Again, 26 minutes and counting to the opening of that window. Teams monitoring winds. But, otherwise, everything tracking on track for launch. Again, keep those questions coming in the chat. Tag us with that NASASpaceFlight. We're going to keep them coming until we get to that business end of the countdown. To preview a little bit, I believe we'll get into that terminal count bit just about 15 minutes from liftoff. So we're just over 10 minutes away from things really kicking into high gear here. In the meantime, let's go ahead and listen back into the countdown net as the countdown proceeds.

Speaker 2 (00:32:34):

Configure update in 30 seconds. LC ether countdown. Ready for config when you are.

Speaker 3 (00:32:36):

Three.

Thomas Burkhardt (00:35:18):

Carolina, I think we have an update on the countdown as it progresses.

Carolina Grossman (00:35:20):

Yes, absolutely. Things are moving right along. We have word that we will likely enter a hold at T minus 20 minutes for a few minutes while the teams spend some additional time on software configurations. But everything is proceeding nominally at this time.

Thomas Burkhardt (00:35:36):

Yeah. We'll stand by for a new T-0 once that hold clears. Again, coming up on a hold in just over a minute, as teams can do, to just make sure the rocket is 100% ready to go. In the meantime, we have more questions, so we're going to keep those coming. Let's talk a little bit about engines and propulsion. This rocket, I believe, has five engines on the first stage, one on the upper stage. Can you talk a little bit about those?

Carolina Grossman (00:35:57):

Yes, absolutely. So our engines on this vehicle are all designed and built in-house by Astra. Our five first stage engines are electric pump-fed engines. We call them Delphins. They each produce about 6,500 pounds of thrust on the first stage, and there were five of them. Then on the upper stage, we have a pressure-fed ether engine, which is about 700 pounds of thrust. Both stages use the same LOX kerosene propellant.

Thomas Burkhardt (00:36:28):

Is there a reason that Astra chose that particular propellant combination for rocket three?

Carolina Grossman (00:36:35):

We like to use things that are simple and efficient, and this was the right choice for this vehicle.

Thomas Burkhardt (00:36:42):

Got you. Again, we're coming up on T minus 20 minutes. You're going to see that clock hold for a little bit. Teams are just working through some final pre-launch checks. There is that hold.

Thomas Burkhardt (00:36:56):

In the meantime, let's talk a little bit about the history of Astra. This is the first live broadcast. Of course, here at NASASpaceFlight, we are very honored to be allowing us to share that with the world. But let's talk a little bit about how Astra got here. What led up to today's launch attempt?

Carolina Grossman (00:37:12):

Absolutely. So Astra was founded in 2016 as a different kind of space company. We were in stealth mode for several years, where we focused on making progress on hardware and getting plenty of launch experience under our belt. So our mission at Astra is to improve life on earth from space to find ways to create a healthier and more connected planet, from powering more efficient and affordable agriculture to helping the forestry industry fine-tune their sustainable practices. The implications of sending satellites to space are exponential for our global economy and populations.

Carolina Grossman (00:37:47):

As we've mentioned before, Astra's headquartered in Alameda, California, which is just across the bay from San Francisco. We have a 250,000-square-foot factory on the grounds of the formal Naval Air Station in Alameda. We test our rocket engines just across the street in indoor test cells that were once used by the US Navy to perform jet engine testing.

Carolina Grossman (00:38:08):

We have conducted two suborbital test launches so far, and today's launch of LV0006 is our third orbital launch attempt, with hopefully many more missions to come. If you're interested in staying in the loop on our work and announcements, you can follow us on Twitter. Our handle is @Astra.

Thomas Burkhardt (00:38:29):

Definitely looking forward to this being the first of many launches to come for Astra, not just from Kodiak, but from elsewhere as well. Again, if you have questions about anything you are seeing, throw them in the chat. Tag us with that at NASASpaceFlight. Now we're going to keep going through those throughout the countdown.

Thomas Burkhardt (00:38:43):

Again, if you're just joining us, we're in a hold at T minus 20 minutes. Teams continuing to work through the countdown. We have a fair bit of time in today's window. So we'll just keep an eye on when that clock is released for a new T-0 time.

Thomas Burkhardt (00:38:57):

But, in the meantime, propelling load is still underway. You can see the vehicle getting nice and frosty as these super cold liquid oxygen flows in and the kerosene on the bottom of that. Yeah, we're going to continue to provide updates as the countdown proceeds. Again, as I say, let's listen into the countdown net. The countdown net gets nice and quiet. We will keep listening into that and checking in on how the teams are proceeding through the countdown. In the meantime, we'll keep taking some questions here. About those launch teams, we have a question about what's the difference between a launch conductor and a launch director?

Carolina Grossman (00:43:22):

Yes. So our launch director is the final launch authority who's responsible for the safety of overall launch operations, while the launch conductor is the person who oversees and directs launch vehicle operations. It's the one who's following the countdown manual, who can call hold, recycle, or abort as required. As we are in this hold, that is one of the responsibilities of the launch conductor. We are in this hold as the team updates their software configurations on the vehicle.

Thomas Burkhardt (00:43:52):

Got you. A couple of questions about the operations around today's launch. We have one asking how big is the exclusion zone around this rocket and does anyone have to vacate the area to launch from Kodiak today?

Carolina Grossman (00:44:04):

Yes. We do want to make sure that safe operations of both people and property are followed. So don't know the precise dimensions of that exclusion zone, but we are working with the coast guard and the FAA to make sure we're clearing the airspace and we're clearing the ocean as well, and making sure that the beaches are also clear of anyone who may be a little too close to our rocket launch.

Thomas Burkhardt (00:44:32):

Keeping on the topic of launching from Alaska, we have a question asking isn't that less efficient than launching from, say, Florida or someplace closer to the equator?

Carolina Grossman (00:44:42):

Well, that entirely depends on where you want to go. So our payload today, our test payload, which will not be deployed, is going to a high inclination, and Kodiak is great for reaching those types of orbital inclinations as well as polar orbits. So different launch sites can get you different access to different portions of space. And so, we really like launching from Kodiak when we need to go to those polar orbits.

Thomas Burkhardt (00:45:10):

Correct me if I'm wrong, I think it would actually hurt you if you were trying to launch to a polar orbit from Florida, because you actually have to get rid of a lot of that extra velocity you get from being closer to the equator.

Carolina Grossman (00:45:19):

That's right.

Thomas Burkhardt (00:45:20):

So those low inclination missions which launch closer to the equator, they take advantage of that. But if you're trying to launch it to a polar orbit, it actually hurts you, which is why launching from up north in Alaska works so well.

Thomas Burkhardt (00:45:31):

Also, I believe there's another benefit, at least for these early test flights, for being at a launch space that's not very busy and more remote than some of the more busier and more traditional launch complexes.

Carolina Grossman (00:45:42):

Right, definitely. One of the reasons why we have enjoyed working at PSCA, our Pacific Spaceport Complex, and Kodiak is because they've been really helpful in working with us on getting the availability that we need and making sure that we can hit our launch schedules and our targets.

Thomas Burkhardt (00:46:04):

We're seeing a lot of really cool venting from the pad there. You can also listen into the pad mics and hear that. It's super cool to hear. About that ground equipment, though, people are asking, does that launch base also fit into the shipping container, not just the rocket? I believe it's all the equipment ships up that way, right?

Carolina Grossman (00:46:19):

Right. Everything that you see here fits in standard shipping equipment. So that rocket itself fits in a 45-foot shipping container and everything else that you see, aside from the concrete ground, does go over boats and trucks to our launch site.

Thomas Burkhardt (00:46:39):

Also, we're getting a really good view here of the top of this rocket, that payload fairing. We have a question about that coming from the chat. It's got a bit of a unique shape. It looks like it might even split into more than two pieces. If that's not the case, what is the deal with that cool fairing sheet?

Carolina Grossman (00:46:53):

Yeah, we will hopefully see the fairing split. It is broken down the middle into two halves. And so, one of the things we were really hoping with today's flight is that we see that beautiful fairing separation of the two halves coming apart so we can complete our mission. If we were to deploy a payload, that's when we would deploy a payload after that fairing has separated from the vehicle. But, again, it is a test payload today that will not be deployed.

Thomas Burkhardt (00:47:20):

A bit of a unique aspect to the Astra Rocket 3. I believe that fairing separates also not just to expose the payload, but to expose the upper stage. That fairing actually separates prior to the two stages separating, right?

Carolina Grossman (00:47:31):

That's correct.

Thomas Burkhardt (00:47:33):

So as we continue to move towards our eventual launch time, again, teams are currently holding, continuing with those pre-launch preparations. But once we can get that clock counting again, as long as those winds cooperate as well, we'll hopefully be able to see that really cool state separation. It's very cool to see.

Thomas Burkhardt (00:47:51):

In the meantime, if there is a hold later in the countdown ... I know we did not get into terminal count yet, so we haven't had this issue yet. But once we get past that terminal count point, about 15 minutes into launch, how fast can that rocket recycle and make another launch event?

Carolina Grossman (00:48:07):

Yes, absolutely. So with this type of hold, we would pick up the count right where we left off. If we are within that 15-minute terminal count period, we would recycle the launch attempt from the top of that 15-minute mark.

Thomas Burkhardt (00:48:26):

For this particular version of the rocket, a question in the chat about what the maximum weight for a payload on Rocket 3.3 is right now.

Carolina Grossman (00:48:33):

Right. So, again, that depends on where we're launching from and where the payload wants to go. Our capacity does vary because we are a small rocket. There's some variants in how much payload we can get to different orbital destinations.

Thomas Burkhardt (00:48:53):

We talked a little bit earlier about Astra working to also scale up to slightly bigger rockets, hit those different payload mass goals and things like that. Astra's got a lot of long-term goals, that big one being that daily launch cadence, which is so cool just to think about that being enabled. Where do you see Astra in the next 10 years or so?

Carolina Grossman (00:49:13):

Absolutely. I think daily space delivery is something that we've said we are passionate about and we are heading towards. And so, we're making strides towards that goal. It'll also be really interesting to see where the whole industry is 10 years from now. Thinking back 10 years ago, that was near the end of the space shuttle program. Many of these commercial launches were just coming on the horizon. It's amazing to see the progress that I don't think could have really been imagined at that point 10 years ago. So who knows where we're going to be 10 years from now, but I hope it means a lot of rockets.

Thomas Burkhardt (00:49:50):

For the NASASpaceFlight editors watching this stream, you hear that? That was a shuttle reference. We got one in for this stream, okay? We're going to continue checking in for activity on the countdown net and listening into those pad mics as we wait for teams to continue working towards clearing this hold. If you are just joining us, we're here at Alameda's headquarters in California for live coverage of the launch vehicle 0006 launch. My name is Thomas Burghardt. I'm a news director at nasaspaceflight.com. Joining me is Carolina Grossman, Director of Product Management at Astra. We are still in a hold right now. Do you have any updates for us?

Carolina Grossman (00:55:38):

No new updates since the last time we heard from the team. They are loading software configurations and we are still holding at T minus 20 minutes.

Thomas Burkhardt (00:55:48):

We have gone through a very large part of the countdown to get to this 20-minute mark. Teams continuing to work through some issues. But in the meantime, let's talk a little bit about the launch that preceded this one. We want to show a highlight video of Rocket 3.2's trip to space.

PART 2 OF 4 ENDS [00:56:04]

Thomas Burghardt (00:56:01):

Video of rocket 3.2's trip to space. And this is what we're going to be hoping to see later today, hopefully. There was that water deluge that we said was very dramatic, but it looks very cool. And there's only some minor changes from this rocket 3.2 launch to the one we're hoping to see today. So should look fairly similar if all goes well.

Carolina Grossman (00:56:22):

That's right. We are hoping that we have resolved the issues that caused us to fall just shy of orbit. And we've also made some changes to increase our payload capacity on this vehicle.

Thomas Burghardt (00:56:35):

This is a nice small rocket. So you'll notice that, in those early clips, it really likes to leap off the pad. I'm really looking forward to that. And then these stunning onboard views of state separation in the upper stage ignition, hoping to get that live today as well.

Carolina Grossman (00:56:47):

Absolutely. It was an amazing moment here for the team and Astra to see that engine light and that beautiful stage separation is what you're seeing now, the fairing falling away. And it was a very, very exciting and happy day for us at Astra.

Thomas Burghardt (00:57:05):

Okay. In the meantime, we're going to keep taking some questions from chat. And I've got one here asking about the lightning protection system out there in Kodiak. I see I've got two, like, phone poles with lightning rods on them. Is that your lightning protection system?

Carolina Grossman (00:57:18):

Yeah, I was going to say. You took the answer just like Jeopardy. That is our lightning protection system.

Thomas Burghardt (00:57:25):

So it is not the four towers that we may have seen out in Cape Canaveral sometimes. But still, a lightning protection system out there for rocket 3.3. Keep it going with some questions here. People are asking, is Astra thinking about anything beyond low Earth orbit or Earth orbit?

Carolina Grossman (00:57:41):

Well, our focus and our mission is to improve life on Earth from space. So we are keeping focused on Earth orbit.

Thomas Burghardt (00:57:49):

Another question from chat, asking, how long does it take to manufacture one of Astra's rockets?

Carolina Grossman (00:57:58):

Right. Well, we are actually ramping up for a monthly production and hoping to complete three launches this year. So that is where we're at, at the moment. And hoping to continue making that faster and faster as we take steps to daily space delivery.

Thomas Burghardt (00:58:16):

And can you talk a little bit about how Astra is working towards achieving that? Achieving, not just the high launch cadence, but the low cost building price for these rockets?

Carolina Grossman (00:58:24):

Yeah, absolutely. It's certainly one of the unique aspects of our launch system, is that we focus on proven and cost-efficient parts as much as we possibly can. As we've said earlier in the broadcast, many of the components that you see on the rocket come into our factory as raw sheet metal. And we have our in-house machine shop team and our production team that turns it into flight hardware. And so we try and stay away from costly and labor-intensive materials like carbon fiber and 3D printing. We do use them sparingly, but they tend to be expensive, and more importantly, they are very difficult to build at scale. So we're focused on making a production line that can build and test rockets at an unprecedented pace. So we need to aim for simplicity in that design. And as we like to say at Astra, simple scales.

Thomas Burghardt (00:59:17):

Again, if you are just joining us, we're in a hold at T minus 20 minutes, as launch teams continuing to work. We'll continue to provide updates as they move towards clearing that hold and moving back towards the T-0.

Thomas Burghardt (00:59:27):

(silence)

Astra LC (01:04:01):

Okay. This is Astra LC on countdown. We are at step 112. We were doing software load, then setting ourselves a new T zero time. Tango, have you refreshed and are you ready for config loads?

Tango (01:04:17):

Yes.

Astra LC (01:04:19):

Tango, at this time, please go into machine pump battery two. Manage pump battery charge. Toggle, stop charging batteries.

Tango (01:04:27):

Copy that. Stopped.

Astra LC (01:04:33):

In AV1, managed power systems, please toggle off, Guidance Power System Authority.

AV1 (01:04:40):

Off.

Astra LC (01:04:42):

In AV1 managed pulling, toggle to only ground.

AV1 (01:04:46):

Only ground.

Astra LC (01:04:48):

And Tango, let me know when you're ready to load new configs.

Tango (01:04:52):

Tango is always ready.

Astra LC (01:04:53):

Engine A125V7.

Tango (01:04:55):

A125V7 loading. Loaded.

Astra LC (01:05:06):

B126V7.

Tango (01:05:07):

B126V7 loading.

Tango (01:05:07):

(silence)

Astra LC (01:09:01):

Tango, are you ready to try to load engine Charlie?

Tango (01:09:04):

I am.

Astra LC (01:09:06):

C127V8

Tango (01:09:06):

Delphin C127V8 loading.

Tango (01:09:13):

(silence)

Astra LC (01:10:41):

Tango, engine delta.

Tango (01:10:44):

Delta.

Astra LC (01:10:45):

128V7.

Tango (01:10:45):

128V7 loading. Loaded.

Astra LC (01:11:08):

Engine E129V7129.

Tango (01:11:09):

T29V7 loading.

Astra LC (01:13:14):

Okay. Tango, I'd like you to try loading Aether sequence 101V10.

Tango (01:13:21):

Aether controller config 101V10 loading.

Astra LC (01:14:07):

All right. And Tango, I'd like you to load guidance configuration 5V127.

Tango (01:14:15):

Guidance config 5V127 loading. Loaded.

Tango (01:14:18):

(silence)

Astra LC (01:15:42):

All right. Tango, with guidance config loaded, can you please give me a GNC set up, please? Calling out when complete.

Tango (01:15:50):

Copy of that. Setting up GNC.

Tango (01:15:53):

(silence)

Thomas Burghardt (01:18:26):

And if you're joining us, we are still in a T minus 20 minute hold. However, teams are working through it.

Tango (01:18:31):

GNC setup is complete.

Astra LC (01:18:31):

Thank you, Tango. And then AV1 managed polling, please set us back to both ground and guidance.

Thomas Burghardt (01:18:36):

And we're getting very close to a new T-0.

AV1 (01:18:37):

Both ground and guidance.

Thomas Burghardt (01:18:38):

So standby, we should have a new launch time for you shortly, as teams continue to resolve just some quick issues before we released the hold and get back to counting down.

Carolina Grossman (01:18:45):

Weather's still looking good. So we hope to have that new T zero very soon.

Carolina Grossman (01:18:48):

(silence)

Astra LC (01:18:48):

This is Astra LC on countdown. We are picking the count back up at this time. We are on step 119, moving into Delphin pump spins. Tango, can you please activate machine AV1 power ESCAs dry spin?

Tango (01:20:02):

It is active.

Astra LC (01:20:06):

Tango, please toggle on power ESCs.

Tango (01:20:09):

Power ESCs toggled.

Thomas Burghardt (01:20:37):

And as you can see, we're now counting down. We've recycled the clock just a little bit now. 21 minutes and counting. That gives us a T-0 of 45 minutes past the hour. 2:45 PM Pacific Time, our new target launch time. Carolina, how are things looking for the launch attempt today?

Carolina Grossman (01:20:52):

Well as you've heard, we were in a hold. Troubleshooting some software configuration issues, but that seems to be resolved. We're back into the count. The team is now completing pump spins for the first stage engines. And we'll be shortly moving into the final preparations of our pre-flight, including that water deluge test.

Thomas Burghardt (01:21:14):

Gotcha. Now that the clock has resumed, we're going to take a couple more questions before we get into that terminal count section. We do have a question in chat about, will there be any onboard views from the rocket? I can field that one. We are hoping to have some onboard views, but of course, that is dependent on how reliable and sturdy that telemetry connection is. Obviously, there is more higher priority data, so we can't guarantee that connection will stay rock stable. But if it is, we promised that we will be showing it best we can. You can see some of the views on there now. That's actually the second stage, forward-looking camera, up into the payload fairing. One of our onboard views. And we'll be showing those best we can once lift off has occurred. And there is the other stage two camera looking down. You can actually see just the black outline of that Aether engine, which we will hopefully see igniting in space before too, too long today.

Carolina Grossman (01:22:04):

Fingers crossed.

Thomas Burghardt (01:22:12):

Some other questions. We have one from chat asking, what function are those various umbilicals providing between the launcher and the rocket itself?

Carolina Grossman (01:22:19):

Yeah. So those umbilicals will help pump fuel, our propellants onboard the rocket, as well as provide communication. And that's how our team here in launch control in Alameda communicates with the vehicle. And those umbilicals will disconnect as the rocket takes off.

Thomas Burghardt (01:22:41):

And it sounds like we are getting very close to that water deluge test. That'll be a nice visual indicator that the countdown is proceeding. To T minus 19 minutes and counting to the launch. Again, a new T-0 of 2:45 PM Pacific Time.

Thomas Burghardt (01:22:56):

And you just heard, we had another quick weather brief thrown in there, and that the wind profile has looked good right now. So that's another good sign as we count down towards launch. We have another question here in chat, talking about the Apollo Fusion, which is now involved with Astra. Carolina, what can you tell us about that?

PART 3 OF 4 ENDS [01:24:04]

Thomas Burghardt (01:24:03):

Apollo fusion, which is now involved with Astra. Carolina, what can you talk about? Tell us about that.

Carolina Grossman (01:24:04):

Yes, absolutely. We are very excited to have the Apollo Fusion team and technology as part of Astra. We completed [crosstalk 01:24:11].

Thomas Burghardt (01:24:11):

[crosstalk 01:24:11] We will toggle off.

Carolina Grossman (01:24:11):

That acquisition in July

Thomas Burghardt (01:24:14):

And really quick, kind of cut off that answer cause we are coming up on that water deluge test.

Thomas Burghardt (01:24:29):

There we go.

Speaker 4 (01:24:29):

Thank you. In the water, it's just the machine toggle pump full to false.

Thomas Burghardt (01:24:36):

So Carolina, does that look good to you?

Carolina Grossman (01:24:38):

That looks like a successful water deluge test.

Thomas Burghardt (01:24:41):

So hopefully the next time we see that we'll be at ignition.

Carolina Grossman (01:24:45):

Just a few seconds before, yes.

Thomas Burghardt (01:24:47):

Perfect. So, to get back to the question that the water deluge test, so rudely interrupted, can you tell us a little bit about Apollo Fusion and how they relate to Astra?

Carolina Grossman (01:24:54):

Yes, absolutely. So we chose to work with Apollo Fusion because they have a system that is cost-effective and reliable at scale, which is very aligned with what we're trying to do with our rockets at Astra. Apollo's measures their design cycles in months not years, and are focusing on solutions that are easy to manufacture and assemble, and they don't see their job as done when they have something that initially works, but they continue to optimize for manufacturability and scalability, just like we do with our rockets at Astra. And earlier this week, they had some very exciting news that Apollo fusions, thruster ignited in orbit, which is a very important milestone in our journey to provide rapid low-cost access to space. So shout out to the Apollo Fusion team for that milestone, and we at Astra are very excited to continue our partnership.

Thomas Burghardt (01:25:45):

Again, we're at two minutes, 16 minutes and counting, starting to get into the business end of this countdown. One of the next big milestones is going to be the entering of the terminal count at T-minus 15 minutes. So we're just under a minute away from that. We still have some more questions. We'll get through a couple more of these, but of course, as usual, once we get into that business, end of the countdown, we're going to leave it up to the countdown net to do most of the talking here. But before we get to that, we're talking about Apollo Fusion, Astra acquiring them. And we just have a question in chat that they're not super familiar with Astra as a company, don't blame them, the first live broadcast of their launch. Are you guys headed for an IPO? I believe I might know the answer to that.

Carolina Grossman (01:26:22):

Yes, we did also IPO in July. It was a very exciting month for us. So we are a public company.

Thomas Burghardt (01:26:30):

Which is very, very cool. And in an increasingly prevalent part of the space community, that's pretty new, but it's very cool.

Thomas Burghardt (01:26:45):

And again, a teammate is 15 minutes about to enter terminal counts and there is the 15 minute marked, rocket 3.3 now, and its terminal count for the launch of LV triple zero six. So one of the next big milestones will come up at just about 10 minutes, a little over 10 minutes before launch. When the teams will give their final go and no-go for tank pressurization and launch, that's the next really big milestone we're going to be waiting for.

Speaker 4 (01:27:27):

[crosstalk 01:27:27] Copy that. Thank you. We have confirmed Astra FTS is still enabled on the vehicle, can't go at this time in fuel for operate. Can you toggle full?

Speaker 5 (01:27:37):

Full, fast.

Speaker 4 (01:27:43):

Fast.

Thomas Burghardt (01:27:47):

So now that we have entered terminal Carolina [crosstalk 01:27:49].

Speaker 4 (01:27:49):

[crosstalk 01:27:49] Launch machine.

Thomas Burghardt (01:27:50):

I don't want to talk over the count on that. There we go. Now that we have entered terminal count and are about just under 15 minutes from liftoff, how are things looking today, Carolina?

Carolina Grossman (01:28:01):

We are looking good. We are about to set a new UTCT0.

Speaker 5 (01:28:11):

Minutes, four or five.

Carolina Grossman (01:28:12):

And that is that 45 minutes past the hour [crosstalk 01:28:16]

Speaker 4 (01:28:16):

[crosstalk 01:28:16] Seconds, zero, zero seconds zero.

Carolina Grossman (01:28:19):

So we have confirmed that the weather is good for a launch. We have no issues with boats. The range has given us the go-ahead so far. We'll confirm that later on in the countdown.

Thomas Burghardt (01:28:34):

And as we get close to the launches, since again, for those of you just joined, let's go over the details of today's mission, Carolina.

Carolina Grossman (01:28:38):

Absolutely. So LV6 is Astra's third orbital launch attempt and our first commercial orbital launch with the United States Space Force it's for the Space Test Program and by commercial orbital launch, we mean that this is a launch conducted under an FAA commercial launch license. Our goal with this flight today is to successfully reach orbit and do so with a test payload, which we will not release this orbital demonstration launch allows our team to verify numerous upgrades to our launch system, since rocket 3.2 was launched in December. Today's launch is an important milestone in our work at Astra. What we've learned today will get us closer to launching our next payload.

Carolina Grossman (01:29:19):

And before we get further into the count, I'd like to give a big thank you to the entire Astra team and their families watching with us today. We couldn't do this without your support. Thank you all so much. After December's launch, we've been excited to get back to the pad with LV six, as a reminder, in our previous launch, rocket 3.2 successfully passed the Kármán Line, the 100-kilometer altitude that's commonly used as the demarcation of space. While the rocket narrowly missed making it into orbit, we were ecstatic with those results. Rocket 3.2, shut down 12 to 15 seconds too soon after depleting its fuel at a peak altitude of 390 kilometers and 7.2 kilometers per second, which is just half a kilometer per second short of orbital velocity. It's so close. And since then, we've been fine tuning that mixture ratio between our kerosene fuel and liquid oxygen to propel us further.

Carolina Grossman (01:30:23):

I also want to take a moment to recognize the efforts of Astra's Red team. The rocket is controlled from our headquarters here in Alameda, California, and we send a team of six Astra personnel known as the Red team to Kodiak for the launch, because our rocket and support systems were designed with simplicity in mind, we only need a small and nimble team onsite for the launch. It also helps us limit travel, which is a key consideration as the COVID-19 pandemic continues. All six members of our Red team are taking regular COVID-19 tests to protect the health and safety of everyone involved in this mission. We hope you and your loved ones are staying safe out there as well.

Thomas Burghardt (01:31:02):

Absolutely, currently, now we're coming up at T minus 10 minutes, 45 seconds and counting. We are rapidly approaching the final go, no-go poll for tank pressurization and launch. So let's listen in to the countdown net and see if we're good to go.

Speaker 4 (01:31:15):

Active.

Speaker 5 (01:31:15):

Toggle locks, topping.

Speaker 4 (01:31:17):

Lock stopping.

Speaker 5 (01:31:23):

Team, this is the poll for tank pressurization and launch today. After this point, any system issue must be called as a three-word hold. If there are no concerns for flight called go otherwise, call no-go, red lead.

Speaker 6 (01:31:37):

Red leaders go.

Speaker 5 (01:31:37):

FTS.

Speaker 7 (01:31:39):

FTS is go.

Speaker 5 (01:31:40):

Delphin

Speaker 8 (01:31:41):

Delphin is go.

Speaker 5 (01:31:42):

Aether.

Speaker 9 (01:31:43):

Aether is go.

Speaker 5 (01:31:44):

Odin.

Speaker 10 (01:31:47):

Odin is go.

Speaker 5 (01:31:48):

ACE.

Speaker 11 (01:31:49):

ACE is go.

Speaker 5 (01:31:50):

Launcher.

Speaker 12 (01:31:51):

Launcher is go.

Speaker 5 (01:31:52):

Orbit.

Speaker 13 (01:31:53):

Orbit is go.

Speaker 5 (01:31:54):

Booster.

Speaker 14 (01:31:55):

Booster is go.

Speaker 5 (01:31:57):

GNC.

Speaker 15 (01:31:58):

GNC is go.

Speaker 5 (01:31:58):

FAO.

Speaker 16 (01:32:00):

FAO is go.

Speaker 5 (01:32:01):

CDH.

Speaker 17 (01:32:02):

Go.

Speaker 5 (01:32:03):

Tango.

Speaker 18 (01:32:04):

Go.

Speaker 5 (01:32:05):

Safety.

Speaker 19 (01:32:06):

Safety is go.

Speaker 5 (01:32:07):

LD.

Speaker 20 (01:32:08):

LD is go.

Speaker 5 (01:32:08):

LC is go as well. Tango. in AB1 managed polling toggle do only ground.

Speaker 18 (01:32:20):

On the ground.

Speaker 5 (01:32:21):

Delphin please provide flight engine sequences for us for today.

Speaker 8 (01:32:28):

Engine alpha sequence 7, 8, 5, vector nine. Alpha 7 8 5, vector nine slot zero loading. Loaded.

Speaker 5 (01:32:41):

Engine Bravo 7 8, 6, vector five.

Speaker 21 (01:32:45):

Bravo 7 8, 6, vector five, slot zero loading.

Thomas Burghardt (01:32:59):

And as you just heard teams have polled go for the launch of launch vehicle triple zero six. Astra's third orbital launch attempt just under nine minutes from now. We're now in the meat of the countdown and getting close to the final countdown towards liftoff.

Carolina Grossman (01:33:15):

And a little bit about our goals for today. We've talked about achieving orbit, but that is very difficult, and so for this reason, we're being realistic with our expectations. Today is our third attempt to reach orbit, and our first test with a sample payload provided by the space force to simulate mass. And right now the team is loading the final flight software onto the vehicle and going through those final preparations for launch.

Thomas Burghardt (01:33:41):

So now that we're just about eight minutes away from liftoff and the teams are counting down towards that T-0 of 2:45 PM Pacific time as when all those final minutes of the countdown now, I'll hand it off to Carolina and the countdown net for commentary of Astra's third orbital launch, attempt to Carolina, take it away.

Carolina Grossman (01:33:56):

Absolutely. We'll start by telling you about the major flight milestones that we'll see on this flight. They will be displayed on your screen for you to follow along at T minus three seconds. The five first stage engines will light. If the engine data looks good, the whole down release mechanisms will let go at T-0 and the rocket will begin its trip to space. At T plus 25 seconds, we will clear the range and fly over the Pacific Ocean. LV six will reach Max Q, which is the period of maximum aerodynamic pressure on the vehicle at T plus one minute. Main engine cutoff or MECO, which signals the end of the first stage burn will occur at T plus two minutes, 18 seconds. This is followed quickly by fairing separation and stage separation. At this point, the rocket will be in space just over a hundred kilometers above the surface of the earth, but then there's more, if all goes well. After stage separation, upper stage ignition happens at T plus two minutes and 32 seconds, and then the upper stage burns for about six minutes until SECO or second engine cutoff at T plus eight minutes and 48 seconds. Then, since we're not releasing an actual payload, the vehicles systems will simulate a signal for payload deployment. If we make it this far, we will have made it to orbit and would consider this flight to be successful.

Thomas Burghardt (01:35:25):

Now, everything continuing to be on track just over six minutes away from launch

Speaker 4 (01:35:40):

Thank you, sir.

Carolina Grossman (01:35:43):

As you just heard, we've just been given the go ahead for launch from the range. And now, in the final, almost five minutes to T zero. We expect that the vehicle will transition to its internal control at T minus 60 seconds, and we'll be continued to listen to the countdown in these final minutes before liftoff.

Speaker 4 (01:36:49):

Team go at this time, please enable launch.

Speaker 5 (01:36:56):

Launch enabled.

Thomas Burghardt (01:37:04):

That's a great shot of the teams here at Alameda watching from next to Michigan control. Just behind us. Again, just under five minutes away from T-0.

Speaker 5 (01:37:12):

Four minutes.

Speaker 4 (01:37:50):

RCO, LC on countdown.

Speaker 22 (01:37:57):

RCO go.

Speaker 4 (01:37:58):

Please verify range is recording telemetry.

Speaker 22 (01:38:01):

Ranges recording.

Speaker 4 (01:38:02):

Copy. Thank you.

Speaker 4 (01:38:24):

Control room. If you require RF data in flight, be prepared to switch over [inaudible 01:38:28] pages. FSO, prepare to issue option command at T plus 1, 6, 4, calling out at event.

Speaker 23 (01:38:46):

FSO, copy.

Thomas Burghardt (01:38:49):

Three minutes. Under three minutes to go to the launch of Astra LV0006.

Speaker 4 (01:39:01):

Any three word hold pulse from here on out is an immediate abort regardless of source.

Speaker 4 (01:39:27):

FTS. Please send master enable and watchdog on AFT.

Speaker 24 (01:39:36):

Master enable issued.

Speaker 24 (01:39:40):

Issuing watchdog.

Speaker 24 (01:39:52):

Two minutes.

Speaker 4 (01:39:55):

EFT if master enable is enabled, I have to use green ready for flight.

Speaker 24 (01:40:00):

Copy. Thank you.

Thomas Burghardt (01:40:03):

Coming up on 90 seconds. Let’s listen in to the final seconds of the countdown for Astra LV0006.

Speaker 5 (01:40:20):

90 seconds.

Speaker 4 (01:40:38):

ACE at this time, please start PSD recordings.

Speaker 11 (01:40:43):

PSD recording started.

Speaker 4 (01:40:49):

60 seconds.

Speaker 4 (01:40:52):

The vehicle is on internal control. First stage tanks are pressing.

Speaker 4 (01:41:05):

45 seconds.

Speaker 4 (01:41:05):

Per stage is that liftoff pressures, 30 seconds.

Speaker 4 (01:41:39):

Water on 10, 9, 8, 7, 6 5 4 3 2 1, Mission zero abort.

Speaker 5 (01:41:54):

That can idle [inaudible 01:42:02].

Carolina Grossman (01:42:02):

Looks like an abort was called at T zero.

Carolina Grossman (01:42:11):

The team will look into the issue and we will hopefully make another attempt.

Speaker 4 (01:42:21):

Tango confirmed that lots of tanks were venting.

Speaker 18 (01:42:27):

[inaudible 01:42:27] tanks is venting.

Speaker 4 (01:42:47):

You confirm Igniters are off and everything is at idle. Confirm vehicle has gone back to GSC power.

Thomas Burghardt (01:43:04):

We got an abort call right near T-0. Teams are currently working through their abort procedures and we are standing by for word of the next attempt.

Speaker 5 (01:43:20):

Equals on UC power.

Speaker 4 (01:43:38):

And Tango please deactivate launch machine at this time.

Speaker 4 (01:43:53):

Okay, going from aboard to recycle track list at this time, Odin, you are good to pull logs.

Carolina Grossman (01:46:07):

So it sounds like the abort was called by our guidance system near T-0. It looked like the engines successfully lit, but the guidance system called an abort. Team is looking into the issue and we will hopefully recycle and we will begin our recycled attempt at T-minus 15 minutes at the top of our terminal count.

Thomas Burghardt (01:46:27):

Just to reminder, there is a fair bit of time in today's launch window, so plenty of time for the team to work through this issue and work towards their next attempt.

Speaker 4 (01:47:47):

This LD on countdown. We're going to scrub for the day. Thank you everybody for following along, but we need to investigate the misfire, and attempt to make another go-around tomorrow.

Carolina Grossman (01:48:10):

All right, and as you've just heard from our launch director, we are going to stand down for the day to troubleshoot the abort that was triggered at T zero. Our window does continue until September 11th. So there's plenty of time for us to try again, and we'll announce our next launch attempt on Twitter. So make sure you're following us at Astra. Thank you so much for joining us.

Thomas Burghardt (01:48:32):

Yes. Thank you Astra for allowing us to share today's webcast. Today's launch attempt with everybody and thank you all so much for watching. Stay tuned for coverage of the next launch at 10, after the teams are able to complete their investigation, that today's abort and see when the next attempt to may be, but stay tuned for future spaceflight news coverage. Carolina thank you so much for joining me today.

Carolina Grossman (01:48:51):

Thank you, Thomas.

Thomas Burghardt (01:48:53):

Absolutely. Until next time, we'll see you then. Thanks for watching.

PART 4 OF 4 ENDS [01:49:49]

Introduction (00:00:00):

(silence)

Introduction (00:00:00):

We have lift off.

Introduction (00:00:00):

Propulsion continues to be normal.

Introduction (00:00:55):

[inaudible 00:00:55] Looks good.

Introduction (00:01:02):

Dialing up. [inaudible 00:01:02].

Introduction (00:01:02):

Eagle delta nominal.

Introduction (00:01:06):

[inaudible 00:01:06].

Introduction (00:01:10):

Yikes. You bet. Concur.

Introduction (00:01:12):

We don’t need any more of these.

Thomas Burghardt (00:01:18):

Hello everyone. Welcome back to our live coverage of lunch vehicle six or LV0006. Astra’s third orbital launch attempt. You’re looking live at the rocket on the launch pad at Kodiak Island, Alaska. And we’re coming to you live again from Alameda, California, Astra’s headquarters. My name is Thomas Burghardt, News Director for NASA Space Flight. And I’m joined once again by Carolina Grossman, Director of Product Management at Astra. Carolina, thanks for joining us again today.

Carolina Grossman (00:01:42):

Thanks for having me, Thomas.

Thomas Burghardt (00:01:43):

So as usual, over the course of today’s broadcast, we’ll be taking your questions live. So if you have questions about what we’re talking about, what you’re seeing, please throw them in the chat, tag us with @NASAspaceFlight. We’re going to get through as many of those as we can over the course of the countdown and the launch. But before we get into questions, Carolina, can you give us an update on how we’re looking for today’s launch attempt?

Carolina Grossman (00:02:01):

Yes, of course. We are at T minus 57 minutes and about 40 seconds from our lift off time. The team has recently completed the go no-go to complete propellant load. And as you can see, that frost line is beginning to appear on the first stage. And the weather is looking beautiful in Kodiak, so fingers crossed for a smooth ride to orbit today.

Thomas Burghardt (00:02:24):

Thanks, Carolina. We know we were a little delayed getting into today's webcast and into today's launch attempt. Can you tell us a little bit about why we had a hold earlier today?

Carolina Grossman (00:02:32):

Yes. So, due to the abort that we had yesterday around our T-0 time, we made some operational adjustments, including a planned hold that just concluded about 15 minutes ago, in order to pre-condition the vehicle for flight. And we believe that this should address the issue that caused the abort yesterday.

Thomas Burghardt (00:02:51):

If you were watching live with us yesterday, you know, LV0006 got all the way down to engine ignition. You're seeing a replay on your screen now, from yesterday. All five engines did light, but shut down before lift-off. The data showed that those five first stage engines were ramping up to full power slower than normal. So as designed, the vehicle detected this and the launch was automatically aborted. After carefully reviewing the data, the Astra team has made some operational adjustments and those should resolve the issue for today's launch attempt. Right now, you're looking at the rocket on the pad. And as Carolina pointed out, you're seeing that frost line up top. As we talked a little bit about yesterday, that is the liquid oxygen tank on the first stage getting nice and frosty from the cool liquid oxygen on the inside, condensing the air around the rocket. Below that is the kerosene tank, which is not super cold. So there's no frost line on the bottom part of the rocket, the first stage. Astra, for those who may not have joined us yesterday who need a reminder, can you tell us just a little bit about what today's mission is all about?

Carolina Grossman (00:03:52):

Yes. The mission today is for the United States Space Force, as part of the Space Test Program. We do have a test payload aboard our vehicle, and this means that it is Astra's first commercial launch. It is a test payload, so it will not be deployed, but we will send a signal that would simulate the deployment and test that capability.

Thomas Burghardt (00:04:15):

Gotcha. And this is of course Astra's third, orbital launch attempt. Two prior launches. Want to talk a little bit about how those launches led into today.

Carolina Grossman (00:04:24):

Yes. So every launch that we have conducted of our Astra vehicles, we intend to learn from and improve. Our last launch in December, we made it very, very close to reaching orbit. We were just half a kilometer/second short of reaching that orbital velocity, but it was a fantastic outcome from what we were hoping to achieve. And so with this vehicle, we've made adjustments, we've resolved that issue and we've made a few other enhancements in order to improve our payload capacity on this flight. And with that, we're hoping for a great outcome with today's launch.

Thomas Burkhardt (00:05:01):

Can you talk a little bit about what those upgrades and changes were between rocket 3.2 and the debut of rocket 3.3 today?

Carolina Grossman (00:05:07):

Yes. So first of all, the issue that caused us to fall a little bit short of orbit was an issue with our mixture ratio control on the vehicle. And so we addressed that issue. And so we expect to deplete our propellant in the appropriate way so that we can make it to orbit today. We also stretched the first stage tank five feet to allow for additional propellant to provide more payload capability. And we consolidated several components on the upper stage of the vehicle to, again, provide more payload capability.

Thomas Burghardt (00:05:41):

Gotcha. Thank you very much, Carolina. We'll keep the questions coming. If you have questions in chat, tag us @NASAspaceFlight. We're going to start getting into those here. First question talking about, where are we launching from today? It's a beautiful launch site up there in Alaska. Can you tell us a little bit about Kodiak?

Carolina Grossman (00:05:59):

Yes. So you can see our launch site is in beautiful Kodiak, Alaska. That is 250 miles south of Anchorage and is actually the second biggest island in the United States after the Big Island of Hawaii. And it is the home of the Pacific Spaceport Complex America, which was opened in 1998 and has been the site of previous Astra launches. We really enjoy both the beautiful scenery there as well as working with the fantastic PSCA team. And we are very grateful to them for their support in continuing to operate safely and efficiently.

Thomas Burghardt (00:06:34):

And I believe there were some advantages from taking these early test flights up there at Kodiak. It's not a very busy launch range. It's not one of the traditional Cape Canaverals or anything like that. And it's also very remote. I believe that gives you some advantages on these early test flights.

Carolina Grossman (00:06:50):

Yes, absolutely. It's been great to be able to work with the team and get the opportunity to have such long launch windows. For example, our launch window for this mission extends through September 11th, which would be very difficult to achieve at a busier range. And so that's just one of the many reasons that we enjoy launching out of Kodiak.

Thomas Burghardt (00:07:12):

So in addition to Kodiak, what is Astra looking for in potential future launch sites outside of Alaska?

Carolina Grossman (00:07:19):

Well, we're looking to get our customers where they need to go. So, we are exploring launch sites within the US. We are on a mission to provide daily space delivery. And the location of our launch sites will really be determined by where our customers need to go. So from different spaceports, you have access to different locations in space. And so this launch site in Kodiak is particularly advantageous for polar orbits and high inclination orbits, but if our customers need to go to lower inclination orbits, then that would be more challenging to get to from a place like Kodiak.

Thomas Burghardt (00:07:56):

Gotcha. Before we dive into some more questions, let's listen in to the pad mics and the teams on the countdown net as the account proceeds past T minus 51 minutes and counting.

Thomas Burghardt (00:08:07):

(silence) And joining our live coverage now is Benjamin Lyon, Chief Engineer at Astra. Benjamin, thank you so much for taking some time to join us today.

Benjamin Lyon (00:09:43):

My pleasure Thomas.

Thomas Burghardt (00:09:44):

So can you talk a little bit about what your responsibilities are here at Astra?

Benjamin Lyon (00:09:48):

Sure. Well really, I think it makes sense to talk about Astra's story so far. I think really, Chris and Adam have done an amazing job to get Astra to a place where it has demonstrated orbital capability. And so my background is really about taking key technologies and taking them from prototypes to products. And so that's really, my job at Astra, is to help Astra really get to that next step.

Thomas Burghardt (00:10:14):

And how are you leveraging your prior experience to make that happen here at Astra, as we're looking at one of the, hopefully, final test flights before moving into a more operational phase?

Benjamin Lyon (00:10:22):

Sure. It's a good question. I think there are a couple of things. The first is, I think there's an incredible of value to focus, is one of the things I've learned in my career. And so really focusing down on executing our ability to get to the rate we want to hit this year, as well as build this team, that is already a set of incredible people, out to a size of a team that can really execute.

Thomas Burghardt (00:10:48):

Yeah, I've heard you talk a lot about, and when we're here at Astra, we see a lot of the teams that are building these kind of rockets and all of these systems, they come from a lot of different backgrounds and there's some really unique perspectives coming into make a truly different launch service. Can you talk a little bit about just how valuable that team really is?

Benjamin Lyon (00:11:06):

Yes. When you want to create a complete product, it's really a whole set of things that come together. It's not just the hardware, it's not just the software, it's not just the services, it's not just the factory operation. It's, all these things have to come together. And when you bring folks from a broad variety of experience. People from tech, people who are rocket scientists, people who have experience working with the various different kinds of customers that Astra has, that makes a real magic happen. And so building a team of folks that are really great, also attracts other folks who are really great. So all of that put together makes just a really kind of magical elixir.

Thomas Burghardt (00:11:46):

That is so cool. And it's definitely visible here at Astra. You see it everywhere. What is your and your team's biggest engineering focus at Astra right now?

Benjamin Lyon (00:11:55):

Well, we're really focused on execution. You saw a vehicle six is on the pad right now. We've got vehicle seven in production. And that is where we're completely focused, is making sure that we maintain the learning velocity and we learn everything we can from every time we go to the pad, and we apply that learning and iterate as quickly as we can.

Thomas Burghardt (00:12:22):

Gotcha. And lastly, one last question before we let you go. Once we get a little further into this countdown and we're getting towards T zero, where are you going to be watching from and what are you going to be doing at lift off?

Benjamin Lyon (00:12:33):

Well, I will be helping out the team as much as I can, on comms outside of mission control. Usually, I find myself in mission control for the last 15 or so minutes. But my job at the end of the day is to let these folks do the great work that they do.

Thomas Burghardt (00:12:48):

Awesome. Benjamin, thank you so much for taking some time to join us and good luck to you and the rest of the team on today's lunch.

Benjamin Lyon (00:12:53):

Thank you, Thomas. Appreciate it.

Thomas Burghardt (00:12:55):

Let's go back to the pad and listen in for some activity on that countdown net, as the countdown proceeds past 46 minutes and counting.

Thomas Burghardt (00:13:00):

(silence)

Thomas Burghardt (00:15:09):

And welcome back, Carolina. We're going to get into some live chat questions here. Our first question, we were talking about Kodiak Island, the launch site, a little bit earlier. And we have a question in chat asking us, how the rocket got up to Kodiak?

Carolina Grossman (00:15:21):

Yeah. So one of the most unique aspects of Astra's launch system is that everything that you see on the screen that is not physically attached to the ground is shippable in standard shipping containers. The rocket itself fits inside a 45 foot shipping container. So we actually send everything up directly from our headquarters and assemble it on site. We also use this exact same test setup at our facility in Alameda, as well as where we conduct our static fire test, which is approximately two hours away from our headquarters, which allows us to test exactly like we are going to fly.

Thomas Burghardt (00:16:01):

That's very cool. And that's a big part of Astra's, not only flexibility in launch sites launching from anywhere with a concrete pad and an internet connection. But also, eventually ramping up to a much higher launch cadence.

Carolina Grossman (00:16:11):

That's right. We see the opportunity for us to be able to set up a spaceport, really wherever we need to meet our customer requirements, and what they need and when they need it.

Thomas Burghardt (00:16:24):

So another question in chat just asking, how tall and wide is this rocket? And, even if it can fit inside a shipping container, can't be too big, but it is a dedicated small launch vehicle. Can you tell us just a little bit about how big it is?

Carolina Grossman (00:16:35):

Yes, absolutely. We have a 43 foot overall length of the vehicle and the diameter is 52 inches. For some other facts, the first stage has five Delphin engines, which are developed and produced, manufactured and tested here at Astra. And the upper stage is powered by a single Aether engine, which is also an engine that we have developed, built and tested entirely in-house.

Thomas Burghardt (00:17:01):

And in fact, I believe that test facility is just in a building across from the one we're standing in right now. Those test cells were really cool to see during our factory tour last week.

Carolina Grossman (00:17:10):

That's right. It's really something to see an engine get built up in the morning and carted over to our test stand across the street, and set up an often fired that very same day. It really helps us innovate, and learn, and gather test data, and make improvements very quickly. So we are very thankful to have these amazing test facilities here at the former US Naval Air Station in Alameda.

Thomas Burghardt (00:17:34):

Another question from chat, are there advantages to having such a small launch vehicle when it comes to development and commercial construction of the rocket?

Carolina Grossman (00:17:42):

Yes. There are many, many advantages, I think, of having a small launch vehicle. First of all, a lot of what we're seeing in the satellite industry is that payloads are getting smaller. And It's kind of like the airline industry. If you have a lot of passengers that all want to go to the same place, well, those big jumbo jets, those large rockets really make sense to get there. But if you need to get there faster and you can't wait for that commercial flight, or if you need to get to a destination that's not quite as popular, then a vehicle like Astra's makes more sense. And we believe that the dedicated small satellite market is something that we're really interested in. And in terms of development, obviously, it takes time to build and develop all of the parts that you see on the rocket and in our launch system. So the smaller rocket is faster to build, frankly.

Thomas Burghardt (00:18:39):

Gotcha. Continuing on with questions in chat. Again, if you have more questions, tag us with @NASAspaceFlight, throw those in the chat, we're going to keep going through those throughout today's countdown. And our next question is talking about where this launch is going. We know it's going to lower earth orbit, but can you tell us more specifically about what type of orbit the rocket is aiming to achieve today?

Carolina Grossman (00:18:58):

Yes. Our target orbit today is an altitude of 415 kilometers and a 70 degree inclination. And again, we are sending a test payload for the US Space Force as part of the Space Test Program. It will not be deployed as part of today's launch, but we do have a payload onboard this flight.

Thomas Burghardt (00:19:18):

So a very nice high inclination orbit, which is an advantage of launching out of Kodiak near the poles. Where I know we were talking about that in depth the last time as well. But not quite a polar launch per se. I'll keep going with the questions here. Here is a great one. I know we have a camera view to show this. Because some people in chat are asking about the guy with the mohawk. He's very popular in chat right now. Can you tell us a little bit about Mr. Launch Coordinator, Chris Hofmann?

Carolina Grossman (00:19:43):

Yes, absolutely. So we can talk a little bit about these folks in our mission control. The gentleman with the mohawk you see there, that is Chris Hofmann, who is our Launch Conductor. He is responsible for overseeing the operations and following all of our procedures. And has the authority to call hold, recycle, or abort, as required. And as a fun fact about Mr. Hofmann, on the side, when he's not launching rockets, he does run a cat rescue. It's rocketcatrescue.org, and on Twitter. And so we love to support our space cats.

Carolina Grossman (00:20:23):

And I can also talk a little bit about the other folks you see in mission control. To Chris Hoffman's right, which is our left, in the navy blue long sleeve shirt, that's our Launch Director, Chris Thompson. He is the final launch authority and is responsible for the safety of overall launch operations. Then continuing counter-clockwise. At the top is our FAA Officer, Luigi. Then we have our Flight Safety System Coordinator, who is Lucas. And he is responsible for the onboard flight safety system. Next to him is Dan Wilson, in the green shirt, who is our Guidance Navigation and Control Master, who ensures weather and wind trajectory information is up-to-date, properly loaded and meets flight criteria. Then to continue, we have our Tango, who is Steve Lai. He is the Vehicle Controller. And so he's the one who is

actually operating the vehicle. You will often hear him when we're listening into the countdown net. And then at the bottom of your screen, you see Chris May, who is our CDH or Command and Data Handling. So he's monitoring and adjusting all of the software and is following commands from Chris Hoffman, our Launch Conductor. And then finally, in the googly eyes, that is our Flight Activities, Officer, Joshua Green. And he is responsible for keeping track of all of our activities during today's launch. So this crew of eight folks is located here in our headquarters in Alameda, actually right behind our camera crew. Up in Alaska, we have a team of six, our red team, that is on the ground helping to set everything up. And a huge shout out to them for all of the work they do. Having a small team to be able to operate the vehicle and set up our launch site has been a huge part of why we've been able to continue operating safely and efficiently during our ongoing COVID-19 pandemic. So we thank the red team for staying safe and for all that they do.

Thomas Burghardt (00:22:39):

Absolutely. And I know we just went to a lot of detail with a lot of different people. But in reality, that's actually a very small team, relatively speaking, for launching a rocket. Which is, of a course, part of Astra's operations. But very cool for the introduction of our mission controllers today. We'll be listening into them on the countdown net throughout the countdown. In the meantime, let's get back to some questions here. And we have one asking, is Astra hoping economies of scale will make up for the lack of re-usability in this rocket?

Carolina Grossman (00:23:08):

Yes, definitely. That's one of the important things that we like to abide by at Astra, is that simple scales. So we are counting on making a mass produced low cost rocket in our journey to achieve daily space delivery and to improve life on earth from space. So we are hoping that the economies of scale and using typically more low cost materials will help be able to deliver on that promise.

Thomas Burghardt (00:23:37):

And then the second part of this question, talking about Astra's competitors in the small site launch market, we know there are several new small site launchers in various stages development. What sets Astra apart from those other companies?

Carolina Grossman (00:23:49):

I think there's a lot of things that set Astra apart. But certainly, I think our approach to using more low cost materials. A lot of what you see on the rocket actually comes into our factory as raw sheet metal, and our in-house machine shop turns those parts into flight hardware. We tend to stay away from 3D printed materials and other costly materials in order to make the rocket as cost-effective as possible. So we can help our customers get to space, not only more efficiently, but also in a more cost effective way.

Thomas Burghardt (00:24:29):

And we're looking live at our screen. We're seeing some vapors coming off of that black structure on the right. Can you tell us a little bit about, first of all, what is that black tower next to the rocket?

Carolina Grossman (00:24:37):

Yeah. So that is our strong back that supports the rocket. And you can see a lot of umbilical wires that connect the rocket and the strong back. So that's how we pump the propellant onto the vehicle. There's also communications links to the vehicle that are provided by the strong back. And then we do vent the system to maintain our pressures right where we want them.

Thomas Burghardt (00:25:05):

And if I'm not mistaken, so that vent we're seeing from the strong back right now, is probably gaseous oxygen, obviously. Am I correct on that?

Carolina Grossman (00:25:12):

I believe you are correct.

Thomas Burghardt (00:25:14):

And of course, along the side of the rocket itself, we're seeing some condensed air. I mean, water vapor forming around the rocket as the supercooled liquid oxygen tank begins to fill and cools the air around that. We see that on a lot of different rockets around the industry, and rocket three is no different. We're coming up on 33 minutes and counting, and we're going to keep going in with these questions. If you have questions, put them in chat, tag us @NASAspaceFlight. You all know the drill. We'll just take a quick break and listen in for activity on the countdown net and those pad mics, as the countdown proceeds.

Thomas Burghardt (00:25:47):

(silence)

PART 1 OF 4 ENDS [00:26:04]

Speaker 1 (00:28:39):

(silence) This is Astra LLC on countdown. We are holding at T minus 30 minutes for propellant fill. (silence)

Thomas Burghardt (00:29:08):

As you just heard, a hold has been called at T minus 30 minutes and counting. We will stand by for more information and provide it when we have it. Again, there's a fair bit of time in today's launch window, so we'll stand by and hope for an attempt to later this window.

Carolina Grossman (00:29:21):

Yeah, that's right. We just got the word that the hold was due to a propellant load. So as you can see, we are filling up our tanks and we are holding to catch up to the point we are in our countdown. (silence)

Speaker 1 (00:30:44):

All good so far. (silence) Burkhardt

Speaker 2 (00:31:03):

Also looking good. (silence)

Thomas Burghardt (00:32:13):

So while we are waiting for this whole to continue while they're waiting for propellant load to catch up on the vehicle, we're going to take a look at an interview from last week where I sat down with Astra's founder and CEO, Chris Kemp, to learn a little bit more about Astra's mission and today's launch. Let's take a look at that.

Thomas Burghardt (00:32:28):

Hi, everybody. I'm Thomas Burghardt with NASA Space Flight here at Astra's headquarters. I'm here talking to CEO, Chris Kemp. Chris, thank you so much for joining us today.

Chris Kemp (00:32:35):

Yeah, thanks for having us.

Thomas Burghardt (00:32:36):

Thank you for coming on to NASA Space Flight Live. That was an absolute pleasure. Some stuff has happened since and we're getting ready for the launch of Rocket 3.3. What are your expectations for this upcoming launch?

Chris Kemp (00:32:46):

Well, we hope to learn a lot. This'll be a test flight of our improved Rocket 3. We'll be taking a test payload from the Space Force and hopefully, we'll have a full flight so we'll be able to collect a full set of data for them.

Thomas Burghardt (00:33:00):

How confident are you in the success of Rocket 3.3?

Chris Kemp (00:33:04):

Well, I think we'll learn a lot. I certainly hope we get a full flight in. A lot of changes we've made and we've incorporated all of the data from a complete flight back in December into this new version. Regardless of what the outcome of the flight is, we'll take whatever we learn. We'll make whatever changes and we'll fly again.

Thomas Burghardt (00:33:22):

What shift in the industry at large is the most important to you and what is Astra's role in that?

Chris Kemp (00:33:26):

Well, I think the ability to quickly iterate. We're seeing both Astra and other companies quickly make another version, another version, another version, learn as much as they can and then iterate. It's really particularly easy to do with such a small launch vehicle.

Thomas Burghardt (00:33:42):

You mentioned launch sites. What kind of places are acceptable for Astra's rockets to launch? Are you limited to the place that we traditionally think of normal launch ranges or is there infrastructure or regulatory infrastructure in place to launch from pretty much anywhere?

Chris Kemp (00:33:56):

Well, we can basically launch anywhere we have a license, which means we just need to find a place where we're far enough away from population centers to not bother people. We're investigating over a dozen different locations both domestically and abroad. Our system could be completely shipped and unpacked and we can launch a rocket within a few days. You can see how that enables us to be very flexible. We're going to continue to be able to develop and iterate on the entire launch system including the spaceport at that same rate.

Thomas Burghardt (00:34:29):

Just on Thursday, I believe Astra received their authorization to operate out of Kodiak, Alaska through 2026. Can you talk a little bit about that?

Chris Kemp (00:34:36):

That's right. We received a launch operator's license from the FAA, and that allows us to launch this version of the vehicle through 2026. It means we don't have to go through a licensing process for every single launch, but as long as we're launching out of the trajectories with the current spaceport, current rocket.

Thomas Burghardt (00:34:52):

What kind of forward work is needed to start launching these rockets from more non-traditional locations, things that are not already established spaceports?

Chris Kemp (00:34:59):

Really, from our perspective, it's just the licensing issue. We just need a fence and a concrete pad and we bring our infrastructure in and we launch. So very little actual work needs to go into setting up the site. A lot of work needs to go in to make sure that we're not going to interfere with the community and we're not going to cause any disruption. So we try to find places that are away from cities and population centers, typically in coastal areas.

Thomas Burghardt (00:35:26):

On NASA Space Flight Live, you mentioned a point to point cargo delivery system as part of the future of Astra. But I believe Astra is looking externally for the reentry part of that. Can you talk a little bit about that decision?

Chris Kemp (00:35:36):

Mm-hmm (affirmative). Well, I think that Astra's focus right now is in mass producing and scaling launch operations. That focus means that we're not off building larger rockets. We're not going to try to put people on a rocket. We're not going to try to work on reentry systems. It's a natural area where we can get something to space. We're going to partner to try to figure out how we get it back to the earth safely.

Thomas Burghardt (00:35:58):

Some other companies have made that same promise of saying, "Listen, we're in the small site launch business. We're never going to go to bigger rockets." Some of the companies have ended up changing their mind. How set are you on that? Is that something you're completely off the table or open to potentially if the market calls for it, Astra's serving into that market as well?

Chris Kemp (00:36:15):

Well, we've already sold over 50 launches. We're very focused on what our customers ask us for. Right now, there is an overwhelming demand for to point-to-point launch services. What that means for us is we can't scale fast enough and we can't focus more attention on continuing to drive the cost down and the scale up of the launch services that we provide today.

Thomas Burghardt (00:36:40):

What do you believe is the sweet spot capability for a small site launch vehicle as far as size is concerned?

Chris Kemp (00:36:44):

Well, for Astra, it was the smallest rocket that would meet the needs of today's market today. That's the 50-kilogram class Rocket 3 series. As we start to see more large mega constellations come online, that sweet-spot moves to around 150 to 200 kilograms where we ultimately seeing it settle out from an economic perspective. This is a small rocket that can deliver approximately 500 kilograms to a [inaudible 00:37:10] inclination orbit.

Thomas Burghardt (00:37:11):

Do you think that you'll fly a lot of missions that are basically a three-stage vehicle similar to Rocket Lab's Electron once you have that spacecraft bus coming online?

Chris Kemp (00:37:18):

Yeah, we think that having more ability to add capacity to the upper stage gives us a lot more flexibility. The Apollo Fusion engine is a great example of a technology that lets us have more precision and more capacity.

Thomas Burghardt (00:37:34):

So these design changes or designs that you're looking towards and the evolutions that you're aiming towards, how does that market and how does that compare to your competitors that are also in the small sat market, which is growing seemingly by the day?

Chris Kemp (00:37:47):

Right. What we're trying to do is focus on flight rate above all else. If we can fly, for example next week, we'll take what we learn. That next rocket will benefit from whatever we learn.

Thomas Burghardt (00:37:59):

On launch day for this upcoming rocket, how is that going to look different from the previous launch as far as personnel involved, the countdown process as far as automation is concerned?

Chris Kemp (00:38:08):

We're really very similar to the previous launch. We have about a half a dozen people up in Alaska. We have about half a dozen people in a launch control room here. We're going to be running the launch using a lot of the same software and systems that we used in December.

Thomas Burghardt (00:38:25):

So what is the objective of this upcoming launch with regards to Astra serving the Space Force in the future?

Chris Kemp (00:38:29):

Well, this will be the first launch of an orbital launch system, so it'll be a test launch being performed for the Space Test Program within the Space Force. What we'll be doing is we'll be launching to a very specific orbit and inclination. We'll be watching that closely. We have a test payload that's been instrumented. So we're going to be looking at the vibrational environments, the acoustic environments, the thermal environments so we can give all that data to the Space Force. This payload will not be deployed from the spacecraft, but we're going to measure our ability to get it exactly where it needs to go.

Thomas Burghardt (00:39:04):

That was great to sit down with Chris Kemp earlier last week prior to today's launch attempt and the launch attempt yesterday. Just a pleasure to sit down and talk with him. If you are just joining us, today's launch attempt is currently in a hold. You can see we're at T minus 30 minutes and holding as teams are just working to catch up on their propellant loading operations before continuing into the really business end of the countdown. In the meantime, Carolina, if it's okay with you, let's dive into some more questions.

Carolina Grossman (00:39:27):

Keep them coming.

Thomas Burghardt (00:39:28):

All right. So a question in chat asking about what do you use to light those Delphin engines on the first stage? Talk a little bit about that?

Carolina Grossman (00:39:35):

Sure. Again, our first stage is powered by five Delphin engines that are developed and built and tested here in Alameda. Each engine produces 6,500 pounds of thrust at C-level and is powered by liquid oxygen and kerosene. We actually have a ground-based ignition system, which is one of the unique features of our vehicle. In order to make the rocket as simple as possible, we try and put more parts into the ground that doesn't fly so they can be heavy. We keep the engines as simple as we can, so we use a ground-based ignition system.

Thomas Burghardt (00:40:16):

So if I understand that correctly, it's about taking as much mass as possible for all the systems needed to begin a rocket launch and putting as many of them on the ground as possible so that once you lift off, you're not carrying all of that mass with you.

Carolina Grossman (00:40:27):

That's right. We can better use that mass to increase our payload capability.

Thomas Burghardt (00:40:32):

On the other side, you also reduce the complexity of the part that is flying, right?

Carolina Grossman (00:40:36):

Exactly. It's a win-win.

Thomas Burghardt (00:40:38):

Absolutely. As we've mentioned many times, simple scales, right? Keeping, going with the questions here. We do have a question about, what propellant does this rocket use to feed those engines?

Carolina Grossman (00:40:52):

Yes. So both the first stage and the upper stage engines are powered by liquid oxygen and kerosene.

Thomas Burghardt (00:40:58):

Got you. When we're looking at our screen there, we're seeing some gaseous oxygen venting from those tanks and the frosty part of the rocket is that super cold liquid oxygen tank above the ambient temperature kerosene tank. That's what you're seeing on your screen. Again, we'll see that continue as more solid frost on that upper part as the propellant loading operations catch up and we can get towards releasing this hold. We've talked a little bit about this yesterday, but that ice that's forming the frost on the outside of the rocket, that's a negligible amount of mass that shouldn't affect the flight of the rocket.

Carolina Grossman (00:41:30):

Yes, that's right. You'll potentially see large chunks of ice as it forms fall off the rocket. That is expected

Thomas Burghardt (00:41:40):

Diving back into some more chat questions. Do you believe the reusable vehicles full or partial are necessary to achieve the goal of daily spaceflight or is it possible to get there with expendable vehicles?

Carolina Grossman (00:41:52):

Well, as we've talked about, our strategy really focuses on expendable vehicles. We are not pursuing reusability at this time. We believe that we can make a rocket that is much cheaper and more efficient if we focus on expendable vehicles.

Thomas Burghardt (00:42:12):

Got you. Another question here. There is a lot of talk about space's commercial future, and what is Astra's role in this new era of commercial space flight?

Carolina Grossman (00:42:22):

Yeah, certainly. Astra's mission is to improve life on earth from space. We do that by providing services to satellites that are helping to observe and connect and improve the health of our planet. So what we hope to offer in the future of commercial space flight is unprecedented access through daily space delivery at affordable prices by using our launch system that is manufactured at scale.

Thomas Burghardt (00:42:51):

We also have a question here asking, and I think I might be able to even field this one. How many cameras do we have tracking the rocket? Are they all automated or do you have any camera operators? I can give a quick shout out to Mr. Brady Kenniston, one of the NASASpaceFlight photographers out there with Astra today. Actually, you're looking at his camera view. The rocket will pop out from those trees after liftoff. So we've got a human camera operator out there as well as a lot of those robotic cameras. I believe there's one other tracking camera that's actually pretty cool to talk about.

Carolina Grossman (00:43:20):

Yes, we do have a tracking camera on our dish antenna as well. That is the system that we use to provide radio link in. We have that camera ready to go. We have lots of camera feeds that we hope to be able to show you during flight.

Thomas Burghardt (00:43:34):

If I understand that correctly, that camera view is literally on the telemetry checking disc, which of course has to be pointed at the rockets. So as by-product, you have a camera pointed at the rocket.

Carolina Grossman (00:43:42):

It is simple scales, like what you say.

Thomas Burghardt (00:43:45):

Yeah, there you go. We're also seeing some really cool onboard views. There's an onboard camera on the rockets first stage. You can see the frost forming on the outside. We talked a little bit about this yesterday. I don't know how reliable that camera feed will be once the rocket actually lifts off, but assuming it does work, we're going to show those as much as possible because they are really cool views. Back to our ground-based camera views. Again, that's countdown currently in a hold, so we're taking some questions in the meantime while those propellant loading operations catch up so they can resume the countdown. Our next question from chat asking about the Kodiak, Alaska launch site. Looks pretty beautiful out there now, but a question in chat asking, is this launch site still usable in the middle of winter?

Carolina Grossman (00:44:22):

Yes, absolutely. Our last launch out of Kodiak was actually in December in the middle of winter. So it is a different picture, a lot snowier, but no less beautiful. Our Red team tends to be bundled up and beanies and big coats, but we do use this launch site and have operated at this launch site year-round.

Thomas Burghardt (00:44:43):

You mentioned the Red team. We have a question in chat about talking about the Red team leader. Who's the red team leader today? Just tell us a little bit more about the Red team out there in Kodiak.

Carolina Grossman (00:44:52):

Yeah. So our Red team leader is Adam Fritsch, who I'm sure is very excited to get this shout out right now. Kudos to whoever friend posted that question. Our Red team is a team of six folks who go up to Alaska with all of our launch support equipment and our vehicle. They are the ones who set everything up and ensure the safe operation of everything on the ground. It's pretty remarkable that it only takes six people to set up the entire launch site that you see in front of you today.

Thomas Burghardt (00:45:22):

The other half of the launch operations team in Michigan. [inaudible 00:45:26], can you tell us a little bit about where that mission control is situated?

Carolina Grossman (00:45:28):

Yeah. So our mission control, we spent a few minutes ago, spent some time walking through those different roles, but that mission control team is right here at our headquarters in Alameda. They're sitting directly behind our broadcast area if you've seen that. This is in our factory. In addition to these eight folks, we have about a dozen engineers who are the responsible engineers for the different systems on the rocket. They're the folks who will be pulled during our go/no go polls throughout our countdown. They are actually also dispersed throughout our factory office. We have a great setup where they're able to be at their desks with the light to notify folks that they should not be disturbed and are in operations. So we are a very lean team as we control the vehicle and operate it for launch.

Thomas Burghardt (00:46:19):

I have another question in chat here asking, are there any superstitious rituals done before each of Astra's flight?

Carolina Grossman (00:46:27):

Well, I don't know if there's any official rituals, but we certainly have our own little superstitions here. Our launch conductor, Chris Hofmann's mohawk tends to change color as we enter a launch campaign.

Thomas Burghardt (00:46:41):

Okay.

Carolina Grossman (00:46:41):

There's quite a few folks in here who are wearing their lucky socks. I, myself, listened to some pump-up music on, on my drive in, in particular, No Scrubs by TLC. That's for good luck today.

Thomas Burghardt (00:46:54):

Excellent.

Carolina Grossman (00:46:54):

So we do have our share of fun traditions that we try and keep our fingers crossed for a smooth ride to orbit this afternoon.

Thomas Burghardt (00:47:04):

Absolutely. I can definitely understand that No Scrubs philosophy. Hoping for a successful countdown today. Continuing on with some questions here. One question about what this rocket's name is. We're calling it LV0006. We're also calling it Rocket 3.3. You want to explain about that a little bit?

Carolina Grossman (00:47:24):

Sure. Rocket 3.3 is the version number of this rocket and LV0006 or LV triple zero six is the serial number of this particular rocket. So that Rocket 3.3 number refers to the precise configuration of this rocket and that includes the changes that we made from our previous flight in December, which was for Rocket 3.2, but LV0006, LV6 is the name of this vehicle. We are focused on that serial number because we hope to make many copies of this same vehicle. We also hope to continue to increment those numbers and someday be at LV9999 and beyond.

Thomas Burghardt (00:48:09):

Excellent. Continuing on with the questions. Another question about the engines that we're using. We know there's the one type of engine on that first stage. There's five of them, and a different engine on the upper stage. Want to talk about those a little bit more?

Carolina Grossman (00:48:21):

Absolutely. Always happy to talk about our engines and our fantastic propulsion team that develops them. We've talked quite a bit about the first stage Delphin engines, but the upper stage engine is Aether. It is a pressure-fed engine and we have one of those powering the upper stage of LV6. It has 740 pounds of thrust at vacuum, and it is also powered by liquid oxygen and kerosene. Again, just like the first stage engines, our upper stage Aether engine is also developed, built, tested, manufactured entirely in-house by our team here in Alameda.

Thomas Burghardt (00:49:07):

Got you. Another question about what we're looking at on screen here actually, is there a flame diverter as part of that launch or underneath the rocket?

Carolina Grossman (00:49:10):

Yeah, it's a little difficult to see, but in that cube-shaped structure that the launch tool that the rocket sits on, there is something that looks like a slide. That is the flame diverter for the rocket.

Thomas Burghardt (00:49:24):

Yeah. We can make it out just in this camera view. You can see it on the bottom. It'll be nice and obvious at engineer ignition, you can see the thrust getting diverted out to the side. So once we reach that milestone, it'll be even more visible, but yeah, you can just make it out in this camera view a little bit.

Carolina Grossman (00:49:39):

We also do have a water deluge system. The deluge test will happen at about T minus 20 minutes or so as one of the final steps before we enter our terminal account. That water deluge system serves the purpose of suppressing sound as well as getting rid of any flames that may fall astray to protect the beautiful landscape and preserve the safety of people and property at our launch site.

Thomas Burghardt (00:50:11):

Right now, we're continuing on with some questions from chat. In the meantime, if you're just joining us, we are on T minus 30 minutes. Holding teams just working to catch up on some propellant loading operations prior to releasing the hold while we're standing by for a new launch time once that hold can be released. Taking another question from chat, Carolina, someone's asking what is the next Astra mission?

Carolina Grossman (00:50:33):

Well, we are hoping to and on plan to complete three missions this year. So you'll have to stay posted on our news for updates about our next mission, but we plan to complete three flights this year.

Thomas Burghardt (00:50:45):

Got you. That'll be more of a monthly launch cadence, which is a part of that ramp out towards the eventual goal of daily launch operations.

Carolina Grossman (00:50:52):

That is our hope.

Thomas Burghardt (00:50:53):

We have a question about that. Someone asking about, what are Astra's thoughts or opinions about the environmental impact of launching these nonreusable rockets, these expendable rockets at a daily launch cadence?

Carolina Grossman (00:51:06):

Absolutely. We do have most of our rocket is made out of aluminum, which does corrode in salt, so it does degrade. The first stage does degrade when it falls into the ocean. Also, as a smaller vehicle, we are much lighter and can use a lot less fuel. As we are able to calculate and project where the first stage will land during and after its flight, this not only serves a purpose of helping us to ensure safety, but we are also looking at long-term options to minimize the ocean debris. Similarly, when it comes to space debris, the materials we use and the satellites we launched are not intended to remain in orbit forever. So when the upper stage and theoretically, any payloads we launch do fall out of orbit, they will burn on reentry.

PART 2 OF 4 ENDS [00:52:04]

Carolina Grossman (00:52:02):

You fall out of orbit, they will burn on re-entry.

Thomas Burghardt (00:52:05):

Got you.

Thomas Burghardt (00:52:07):

Continuing on with more questions here, we do have one asking about these hoodies, I'm wearing one right now. I don't know if we can cut to it really quick. I can show off the Astra on the shoulder, if... There we go, as you see. So we do have a question in chat asking, how can we get these hoodies?

Carolina Grossman (00:52:22):

Well, we don't have an Astra merch shop at the moment. So the only way to get one of those hoodies is to be an Astra employee or be one of our close friends. So you can learn more about joining the Astra team at astra.com/careers. We have many roles open and are hiring very quickly as we scale up our team and continue to work towards our goals. So if you were interested in working with us and getting cool hoodies, we got cool water bottles too. So please check out astra.com/careers to learn more about how you can join our team.

Thomas Burghardt (00:53:15):

And we also have an update to share, we are currently in a T minus 30 minute hold while they are working on catching up on proponent loading operations. We are hearing that we are getting close to releasing that hold. So we will stand by for a new T-0 and provide that as soon as we have it, but standby for our release of the whole before too long.

Thomas Burghardt (00:53:32):

To kind of finish off that thought about joining the Astra team. We used to have one specific question does Astra anticipate hiring any DevOps engineers in the near future? Asking for myself, says Alexander.

Carolina Grossman (00:53:43):

Well, Alexander, we have so many open roles that I don't know to speak to specific ones, but you can check out our careers page and see the available job postings.

Thomas Burghardt (00:53:52):

A relevant question, asking how many people work at Astra currently?

Carolina Grossman (00:53:57):

We are growing so quickly, it is kind of hard for me to keep track, to be honest. But as we've said before, we are still a pretty small and nimble team of a couple 100 folks. So we are growing rapidly and that number is constantly changing.

Thomas Burghardt (00:54:21):

And again, as we are getting close to the release of this hold, hopefully let's go ahead and listen in to the countdown in as controllers get ready to resume the count.

Thomas Burghardt (00:54:26):

(silence).

Speaker 3 (00:56:30):

Astra LC on countdown, we'll be picking up the count with 30 minutes remaining at the top of the hour.

Thomas Burghardt (00:56:53):

And as we just heard again, we're at T-minus 30 minutes and the holding, and it sounds like they're going to aim to release this hold at the top of the hour, so 3 o' clock, PM, Pacific time, which translates to a new launch time of just about two... Or 3:30, excuse me, 3:30 PM, Pacific time. Again, we're standing by for the hold to actually be released, but that is our new, no earlier than launch time, 3:30 PM Pacific time. And so we will stand by for the countdown to resume in just under two minutes.

Thomas Burghardt (00:57:18):

(silence).

Speaker 3 (00:58:41):

The LC on countdown, picking back up. We are currently at step 1 0 2. FTS, can you verify that mission data load values are ready to be loaded onto the AFTU?

Speaker 4 (00:58:56):

FTS confirms the mission data loads.

Speaker 3 (00:58:59):

Everybody's running CAS software as required.

Speaker 4 (00:59:04):

CAS is running on both [EFTs 00:59:07].

Speaker 3 (00:59:09):

Safety, confirm that you have a head count on all Astra employees and guests in Kodiak?

Speaker 5 (00:59:16):

Safety can confirm roll call on all guests. I have two at AMC, the rest are with me.

Speaker 3 (00:59:20):

Copy, thank you.

Thomas Burghardt (00:59:31):

And as you've just seen, we have released the hold we're at T minus 29 minutes and counting now heading towards a new T-0 of 3:30 PM, Pacific time for the launch of Astra's LV0006. Carolina, can you give us an update on how the countdowns proceeding?

Carolina Grossman (00:59:45):

Everything is proceeding nominally, so we have released that hold and we have made all of our operational corrections to address the issue with yesterday's abort. So everything will hopefully proceed smoothly from here.

Thomas Burghardt (00:59:59):

As we get closer to the business end of the countdown, we're going to want to turn our attention to the countdown net and the launch proceedings. So we're going to get through a couple more questions here before we get to that point. A question asking about the process for getting the shipping containers out to the pad look like, is it trucks, planes, boats, what's used to get all that material out to Kodiak?

Carolina Grossman (01:00:18):

So we will generally ship everything in standard shipping containers that will be trucked and shipped by boat. But we have also shipped our rocket by air cargo in the past and do have that capability as well.

Thomas Burghardt (01:00:34):

And on a related note, Astra is known for this mobile launch system. It's a very defining part of the Rocket 3 architecture, what existing infrastructure is needed, at Kodiak to host all of those systems?

Carolina Grossman (01:00:46):

Yes, so we like to say that all we need is a concrete pad and an internet connection, and that's pretty true. We have the capability bring pretty much everything else we need to the launch site in order to set up and fly.

Thomas Burghardt (01:01:05):

Got you. And another question about that launch system asking, how does the rocket firing on the stand affect that launch [ware 01:01:12] system and is there any refurbishment needed between engine firings?

Carolina Grossman (01:01:15):

So as we've mentioned before, that everything that you see, we pack up and use to test at our headquarters in Alameda at other test sites near our headquarters, as well as shipping that up to Kodiak. So we do have a pretty well established procedure for checking out our systems and making sure that any repairs can be made, but generally these systems are pretty rugged and we pack them up and send them on to their next destination. So after the ignition yesterday, our systems continued to be in good shape.

Thomas Burghardt (01:01:50):

Another question about the launch site, asking what are the two [inaudible 01:01:54] parentheses towers for?

Carolina Grossman (01:01:56):

Yeah, so there's this black tower that you see on the left side of the screen now, and now you're going to see both of them on either side, that's our lightning protection system that prevents the rocket and the launch system from being struck by lightning.

Thomas Burghardt (01:02:11):

It would not be a NASASpaceFlight stream without talking about a lightning protection system. We have to hit it every time, it's basically in our contracts.

Thomas Burghardt (01:02:19):

Continuing on with the questions here, is this a cargo only rocket or could Astra one day carry a human capsule?

Carolina Grossman (01:02:25):

We are focused on sending cargo missions, that is part of how we are able to focus on low cost vehicles and manufacturing techniques, because we don't need to provide all of the life support systems you need to send people. We're pretty fragile cargo, so we're sticking with satellite payloads.

Thomas Burghardt (01:02:49):

Got you. Again, if you have questions, throw them in the chat tag, us at NASASpaceFlight. We're coming up on T minus 25 minutes and counting and that terminal count starts at 15 minutes. So we've got just under 10 minutes left until we get into the real business end of this countdown. And we're going to want to keep our focus there once we reach there. Right now, you can see the rocket is propellant loaded, you've got the liquid oxygen tank, nice and frosty in the middle of the rocket. Below that is that bare aluminum for the kerosene tank at ambient temperature. Above that you can see the interstage and the payload fairing, those two together are encompassing the upper stage and the mass simulator payload, the test payload from the United States Space Force's, Space Test program, which of course will not be deployed from today's launch.

Thomas Burghardt (01:03:34):

But that is the vehicle you're seeing next to the strong bag with all of the umbilicals. You can see some venting from the liquid oxygen and the gaseous oxygen venting out of those systems at this beautiful launch site in Kodiak, as we are counting down to its launch of LV 0006.

Thomas Burghardt (01:03:51):

Yesterday, we had an abort at T zero, and we have a question in chat, asking about what happens to that propellant after you have to scrub a launch?

Carolina Grossman (01:03:58):

Yes. So yesterday after we scrubbed our launch attempt, we essentially pump the propellant back off the rocket and start fresh today. So the same system that we use to load propellants onto the vehicle is also set up to be able to pump them off in a safe way and not dump them overboard or anything like that.

Thomas Burghardt (01:04:25):

So everything that we're not seeing, vented from the vehicle, obviously there's some oxygen venting because that's how you keep lox pressurized at the right levels and things like that. But all those other commodities just come right back off the rocket and are used again?

Carolina Grossman (01:04:34):

Mm-hmm (affirmative), that's right.

Thomas Burghardt (01:04:35):

Got you.

Thomas Burghardt (01:04:36):

(silence).

Speaker 6 (01:05:13):

Loading. Loaded.

Speaker 7 (01:05:17):

Igniter is unchanged, one, zero, six, Victor, nine.

Speaker 6 (01:05:22):

One, zero, six, Victor, nine. Loading. Loaded.

Speaker 3 (01:05:30):

Thank you, [Delfin 01:05:30]. Ether, can you please provide your config?

Speaker 8 (01:05:33):

Ether is one, zero, one, Victor, one, two.

Speaker 6 (01:05:39):

Ether to controller, one, zero, one, Victor, one, two. Loading. Loaded.

Speaker 6 (01:06:07):

(silence).

Speaker 6 (01:06:07):

That looks good.

Speaker 3 (01:06:08):

Guidance, what is our latest guidance config for the vehicle?

Speaker 9 (01:06:11):

We’re going to use guidance version five, Victor, one, three, one, L, four, balloon.

Speaker 6 (01:06:19):

Copy that guidance version five Victor, one, three, one. Loading. Loaded.

Speaker 3 (01:06:27):

Copy, thank you all. If config is loaded tango in VB one, turn on, off PDBs. Please give me a GNC setup. Call out when complete.

Speaker 6 (01:06:36):

Copy of that, setting up.

Speaker 6 (01:06:37):

(silence).

Thomas Burghardt (01:06:53):

And what we just heard, they have loaded those software engine configurations into the rocket as we get towards 21 minutes and counting now. And that was the tango call sign, which we have a question in chat about. We heard some call outs during the countdown yesterday, Tango is always ready. Is Tango still ready?

Carolina Grossman (01:07:09):

It appears that Tango is still ready and that Tango is our vehicle controller, [inaudible 01:07:14]. And he is loading that software configuration onto the vehicle. We're getting weather data through weather balloons during our countdown procedures. So we always like to have the latest and greatest before we attempt to launch.

Thomas Burghardt (01:07:28):

I don't want to spoil any future NSF developments, but I must say we have some cool audio bits in that opening sequence. And I think we might've found a new one here at Astra because that's just so cool.

Thomas Burkhardt (01:07:39):

Another question from chat here, asking about those Apollo engine versus the Apollo Fusion thrusters. Can you talk a little bit about that?

Carolina Grossman (01:07:45):

Yeah, so the Apollo Fusion is a company that Astra recently confirmed the acquisition of back in July. And we are very excited to have that technology and team on board. They share a lot of... Their approach is very similar to a lot of our philosophy at Astra about rapid design cycles, focusing on ease of manufacturing and assembly. And this past week Apollo Fusion thruster did ignite in orbit, which is an amazing accomplishment for that team and together where we're working on providing rapid and low cost access to space.

Thomas Burghardt (01:08:26):

Got you. We're coming up on T minus 20 minutes and counting just five minutes away from the beginning of the terminal count. So a brief status update. If you are just joining us, we're targeting a liftoff time of 3:30 PM Pacific time after a hold for some propellant load operations to continue, all systems appear to be operating nominally right now, Carolina, can you just give us a status update of where we're standing now?

Carolina Grossman (01:08:49):

Yes, we're just inside a T minus 20 minutes. And as you heard a few moments ago, we have loaded our final software configuration. The team will now be working on spinning up our first stage engine pumps and we'll be getting into our final preparations, including our water system. Our water deluge system test and that will signal that we have entered the terminal count at T minus 15 minutes.

Thomas Burkhardt (01:09:17):

And if you're tuning in, after yesterday's attempt, we know we did have an abort at just about T zero yesterday, due to a engine configuration and they have applied that corrective issue to come back towards today's launch attempt. We also had a whole during the webcast today of the propellant loading operations, just catching up before we released and targeted this new 3:30 PM Pacific time launch and everything proceeding nominally now. This is the test flight for the US Space Forces, Space Test Program. A test payload onboard today that will not be deployed, but Astra's third orbital launch attempt with LV0006. The debut of the rocket version 3.3. As we come up on 18 and a half minutes, we're going to go ahead and listen in as the team's prepared to enter the terminal count at T minus 15 minutes.

Speaker 3 (01:10:37):

Delphin please confirm status of ESC flags.

Speaker 7 (01:10:43):

ESC flags are nominal.

Speaker 3 (01:10:45):

Tango, toggle dry spin both.

Speaker 6 (01:10:49):

Dry spinning both.

Speaker 3 (01:11:05):

[inaudible 01:11:05] Delphin please confirm results of pump spins.

Speaker 7 (01:11:10):

Pump spins are nominal.

Speaker 3 (01:11:12):

Copy, thank you. Tango deactivate AV1, power EFCA dry spin.

Speaker 6 (01:11:18):

Machine deactivated.

Speaker 3 (01:11:20):

Delphin, confirm your system is ready for launch.

Speaker 7 (01:11:24):

Delphin, is go for a launch.

Speaker 3 (01:11:26):

Aether, confirm your system is ready for launch.

Speaker 8 (01:11:29):

Ready for launch.

Speaker 3 (01:11:32):

CVH, please set ox ISO target pressure back to nine zero PSI.

Speaker 10 (01:11:38):

Set.

Speaker 3 (01:11:42):

Tango, verify vehicle looks ready for lunch inside from tank levels and pressures.

Speaker 6 (01:11:50):

[inaudible 01:11:50].

Speaker 3 (01:12:03):

GNC confirmed wind profiles still look acceptable for launch?

Speaker 9 (01:12:07):

Confirmed, wind profiles look acceptable.

Speaker 6 (01:12:10):

This is Tango on countdown, vehicle looks good.

Speaker 3 (01:12:12):

Copy, Tango on the buttons interface, please toggle spark for 30 seconds.

Speaker 6 (01:12:17):

Copy that. Sparking in 3, 2, 1, spark.

Speaker 6 (01:12:24):

(silence). Spark off.

Speaker 3 (01:12:55):

Delphin, please confirm current on all five igniters.

Speaker 7 (01:13:05):

Current draws nominal.

Speaker 3 (01:13:07):

Copy, thank you. This takes us into our water test. Tango in the water system machine toggle deluge to on. You will toggle back off on my call.

Speaker 6 (01:13:16):

Copy that. Deluge on, now.

Speaker 3 (01:13:18):

Off.

Speaker 6 (01:13:30):

Off.

Speaker 3 (01:13:38):

Good deluge test. Tango in the water system machine toggle pump full to false.

Speaker 6 (01:13:44):

False.

Speaker 3 (01:13:47):

Team [inaudible 01:13:48].

Thomas Burghardt (01:13:53):

And you just saw the successful water deluge test as we have entered the terminal count at T-minus 15 minutes and counting. Carolina, let's go over those details for today's mission, ow that we've entered terminal count.

Carolina Grossman (01:14:05):

Sure, Thomas. LV6 is Astra's third orbital launch attempt and a demonstration mission for the United States Space Force, Space Test Program. It's also our first commercial orbital launch, meaning the launch is being conducted under an FAA commercial launch license. Our goal today is to successfully reach orbit with a test payload that will not be released. This orbital demonstration launch allows our team to verify numerous upgrades to our launch system since rocket 3.2 in December of 2020.

Carolina Grossman (01:14:35):

Today's launch is an important milestone in our work at Astra and a crucial step toward launching our next payload. You can find more information about the flight at our website, astra.com. And we explain more about our approach to reaching orbit and our other objectives for today's mission. Before we get further into the count, I'd like to give a big thank you to the entire Astra team and their families watching with us today. We really couldn't do this without you and all of your support. So thank you again.

Carolina Grossman (01:15:06):

As a reminder, back in December rocket 3.2 successfully passed the Kármán line, the 100-kilometer altitude that's commonly used as the demarcation of space. We learned that rocket 3.2 shut down about 12 to 15 seconds too soon after depleting its fuel only half a kilometer per second, short of orbital velocity, which sounds like a lot, but that is so close. And since then, we finetune the mixture ratio between our kerosene fuel and our at liquid oxygen to propel us the rest of the way to orbit.

Thomas Burghardt (01:15:39):

As we get closer to the liftoff, let's talk a little bit about the vehicle that you're going to hopefully see liftoff in just under 13 minutes. LV0006 is a two-stage launch vehicle. Each stage of running on liquid oxygen and liquid kerosene. The first stage is powered by five electric pump fed Delphin engines, they each produce 6500 pounds of thrust and those are made in-house by Astra. The upper stage also built-in house by Astra powered by a single pressure fed engine called Aether.

Carolina Grossman (01:16:12):

To increase the payload capacities, our current rocket has several upgrades from our last [inaudible 01:16:12] rocket [inaudible 01:16:14].

Carolina Grossman (01:16:12):

(silence).

Carolina Grossman (01:16:42):

[inaudible 01:16:42].

Carolina Grossman (01:16:42):

(silence).

Thomas Burghardt (01:17:28):

[inaudible 01:17:28].

Thomas Burghardt (01:17:28):

(silence).

PART 3 OF 4 ENDS [01:18:04]

Carolina Grossman (01:18:00):

(silence) [inaudible 01:18:45] proper configuration changes that were made and we expect to be picking up the count shortly. So we'll listen in on the countdown to hear that update. (silence)

Speaker 6 (01:19:40):

Disaster LLC. On countdown, we have resumed count. We held briefly to make any minor change to an engine configuration picking back up in terminal count at step 137, FTS confirm Astra FTS is still enabled the nominal.

Thomas Burghardt (01:19:57):

FTS confirms.

Speaker 6 (01:20:03):

And as you can see, the hold has been released for back at 13 and a half minutes and counting just a little brief hold, but back into the countdown, we are in terminal count for Astra's launch of LV0006. That gives us a new T zero of 3:35 PM Pacific time.

Carolina Grossman (01:20:22):

And prior to the hold, we were talking about some of the changes to this vehicle. So to increase our payload capacity, this vehicle has several upgrades from Rocket 3.2, which we launched in December in LV006 six, we've stretched the first stage tank to increase propellant capacity, reduce the mass of the upper stage, added additional sensors to gather more data about flight environments and consolidated over a dozen individual components on the upper stage into one single assembly. The main propellant load has been completed, and we're continuing to top off oxygen prior to launch.

Carolina Grossman (01:20:57):

So, as we've mentioned before, the vehicle is now in terminal count. So we're performing the final checks before we give a go for launch. We've talked a little bit throughout this countdown about the red team, but I also want to take another moment here, if you're just joining us to recognize them. The rocket is controlled from our headquarters here in Alameda, but we do send a red team of six Astro personnel to Kodiak for that launch. And because our rocket and support systems were designed with simplicity in mind, we only need a very small team onsite for the launch. It also helps us limit travel, which has been a key consideration during the ongoing COVID-19 pandemic. All six members of the Red team are taking regular COVID-19 tests to protect the health and safety of everyone involved in this mission.

Carolina Grossman (01:21:47):

We are at just under 12 minutes to lift off and we'll continue to listen to the countdown net, In a few moments, we expect the launch team to conduct a go no-go poll to proceed into tank pressurization and launch

Speaker 6 (01:22:11):

Deactivate ox one, OV 201 first fill.

(01:22:15):

OFF.

Speaker 6 (01:22:16):

OX OV102 turn.

(01:22:19):

OFF.

Speaker 6 (01:22:20):

OX-1OV100B101B FILL.

(01:22:24):

OFF.

Speaker 6 (01:22:25):

Toggle off and deactivate fuel for operate.

(01:22:32):

OFF.

Speaker 6 (01:22:33):

Fuel three supply.

(01:22:34):

OFF.

Speaker 6 (01:22:35):

Fuel one F E 300 upper fill.

(01:22:39):

OFF.

Speaker 6 (01:22:39):

Fuel one F E 201st.

(01:22:43):

OFF

Speaker 6 (01:22:44):

AV 1 radios.

OFF.

Speaker 6 (01:22:48):

AV1 one rocket support cart. Please confirm the following are still enabled and running. Zero stop purging.

Active.

Speaker 6 (01:22:57):

AV one managed polling.

Active.

Speaker 6 (01:22:59):

AV1 managed power systems.

Active.

Speaker 6 (01:23:01):

All flight helium machines.

Active.

Speaker 6 (01:23:07):

VB1 for stage power.

(01:23:10):

Active.

Speaker 6 (01:23:11):

VB1, upper stage power.

(01:23:13):

Active.

Speaker 6 (01:23:14):

VB1 turned on off PDBs.

(01:23:16):

Active.

Speaker 6 (01:23:17):

Water system.

(01:23:18):

Active.

Speaker 6 (01:23:20):

Tango, at this time, I would like to do enable the launch machine.

(01:23:24):

Active.

Speaker 6 (01:23:24):

Toggle locks topping.

(01:23:26):

Toggled.

Speaker 6 (01:23:27):

(silence) On countdown team. This takes us to step 144. This is the poll for tank pressurization and launch today. After this point, any system issue must be called as a three word “Hold” if there are no concerns for flight call “Go” otherwise, call “No-go”. Red lead.

Red lead (01:23:54):

Red lead is go.

Speaker 6 (01:23:55):

FTS.

FTS (01:23:57):

FTS is go.

Speaker 6 (01:23:58):

Delphin.

Delphin (01:24:00):

Delphin is go.

Speaker 6 (01:24:01):

AETHER.

Aether (01:24:02):

AETHER is go.

Speaker 6 (01:24:03):

ODIN.

Odin (01:24:04):

ODIN is go.

Speaker 6 (01:24:06):

INCO.

Inco (01:24:07):

INCO is go.

Speaker 6 (01:24:08):

ACE.

Ace (01:24:09):

ACEs is go.

Speaker 6 (01:24:10):

Launcher.

Launcher (01:24:11):

Launcher is go.

Speaker 6 (01:24:13):

Orbit.

Orbit (01:24:14):

Orbit is go.

Speaker 6 (01:24:15):

Booster.

Booster (01:24:16):

Booster is go.

Speaker 6 (01:24:18):

GNC.

GNC (01:24:19):

GNC is go.

Speaker 6 (01:24:19):

FAO.

FAO (01:24:20):

FAO, is go.

Speaker 6 (01:24:22):

CDH.

CDH (01:24:23):

Go.

Speaker 6 (01:24:24):

Tango.

CDH (01:24:25):

Go.

Speaker 6 (01:24:26):

Safety.

Safety (01:24:27):

Safety is go.

Speaker 6 (01:24:29):

LD.

LD (01:24:29):

LD is go.

Speaker 6 (01:24:31):

LLC is go as well. Tango and AV1 managed pulling ,set us into ground only mode please.

(01:24:40):

Ground only.

Carolina Grossman (01:24:42):

And as you have just heard, the poll has been conducted and the Astra team is “Go” for launch.

Thomas Burghardt (01:24:49):

If you are just joining us, we are currently just under nine minutes away from liftoff for launch vehicles six or LV006 this rocket is an over the clouds vehicle. So if everything goes well, it is fully capable of making it to orbit. However, as a reminder, today’s mission is still a test flight for Astra.

Carolina Grossman (01:25:06):

Yes, historically achieving orbit is very difficult. And for this reasons we are very realistic about our expectations. Today is our third attempt to reach orbit. And our first test with the sample payload provided by the Space Force to simulate mass. And again, we will not be deploying this test payload for the next several minutes. The team is loading the final flight software onto the vehicle and going through our final checklist for launch.

Thomas Burghardt (01:25:31):

Right now, we’re at just about T minus eight minutes and counting as we enter these final minutes of the countdown, we’re going to turn our attention to the countdown nets to the rocket on your screen. And I’m going to hand off commentary to Carolina for Astra’s third over the launch attempt Carolina, it’s all yours.

Carolina Grossman (01:25:46):

Thanks, Thomas. The major flight milestones that you will encounter during flight are displayed on the left for you to follow along at T minus three seconds. The five first stage Delphin engines will ignite, and if the engine data looks good, the whole down mechanisms will release at T zero and the rocket will begin its trip to space, at T plus 12 seconds the rocket will begin pitching downrange to fly south over the Pacific Ocean. LV0006 will reach max Q, which is the period of maximum aerodynamic pressure on the vehicle at T plus one minute and 15 seconds. Main engine cutoff or MECO is the end of the first stage burn.

Carolina Grossman (01:26:26):

And that will occur at T plus two minutes and 50 seconds. This is followed by fairing separation and stage separation. And at this point, the rocket will be in space. After stage separation, upper stage ignition occurs at T plus three minutes and five seconds. The beginning of an approximately five minute long burn until SECO or a second engine cutoff at T plus eight minutes and 20 seconds. And since we’re not releasing our payload today, the vehicles systems will simulate a signal for payload deployment at T plus eight minutes and 30 seconds. If we make it to orbit, we would consider this flight to be extremely successful.

Carolina Grossman (01:27:07):

We are just about six minutes and 30 seconds to launch, and all of the systems are looking good. So we are waiting now for the range to give us the go ahead for launch and we'll continue to listen in to the countdown net.

Speaker 6 (01:27:30):

RCO LC on countdown. RCO LC on countdown.

RCO (01:27:55):

This is RCO ranger green. You are authorized to launch.

Speaker 6 (01:28:13):

Copy. Thank you, sir.

Carolina Grossman (01:28:25):

We're at five minutes to T zero and as you've just heard, the range has given us the go ahead. We are green and I believe we've got a bit of a crowd gathering here at our headquarters watching on our big screen here in Alameda. We also have many members of the team watching from home. AT T minus 60 seconds, the vehicle will transition to its internal control. We're at four minutes and 30 seconds from liftoff, and we will continue to listen to the countdown for these final minutes before liftoff.

Speaker 6 (01:29:38):

RCO on countdown at this time, please verify the range is recording all perimetry.

RCO (01:29:43):

This is RCO, range is recording.

Speaker 6 (01:29:47):

Thank you.(silence) Control room. If you require RFD to after lunch, be prepared to switch over your [inaudible 01:30:04] pages.

Speaker 6 (01:30:26):

FSO. Be prepared to issue option command at T plus one six four calling out an event.

FSO (01:30:35):

FSO copied.

Speaker 6 (01:30:38):

Three minutes, reminder control room. Any three word hold from here on out is an immediate abort, regardless of source. (silence)

Speaker 6 (01:31:19):

FTS, at this time, please send master enable and watchdog on AFTU [inaudible 01:31:31]. Two minutes. Master Naval I'm watchdog had been issued on both AFTU's both AFTU's ready to fly.

Master Naval (01:31:48):

Copied, thank you.

Thomas Burghardt (01:31:50):

Under two minutes to go until Ash does launch of LV0006.

Speaker 6 (01:32:08):

90 seconds.

Speaker 6 (01:32:28):

At this time start PSD recordings.

Thomas Burghardt (01:32:32):

Started.

Speaker 6 (01:32:38):

60 seconds, vehicle is on internal control. First stage LOX tank is pressing, first stage fuel tank is pressing, upper stage tanks have gone to lift off pressures.

Speaker 6 (01:33:08):

30 seconds.

Speaker 6 (01:33:23):

15, 10 seconds water system on. 8,7,6,5,4,3,2,1, ignition, 0.

Speaker 6 (01:33:39):

First motion.

Speaker 11 (01:33:40):

Carolina Grossman (01:33:40):

Our next objective is Max Q. Looks like we're getting some really great footage from our onboard cameras.

Speaker 6 (01:34:39):

It has cleared the island.

Speaker 6 (01:35:35):

Approaching nominal trajectory tracking.

Carolina Grossman (01:35:40):

And at this point we should have also passed Max Q, which is the period of maximum aerodynamic pressure on the vehicle. This is a significant milestone and the most physical stress the vehicle will experience during launch.

Carolina Grossman (01:35:52):

Our next milestone is MECO or main engine cutoff, which is about 30 seconds away.

Speaker 6 (01:36:12):

Vehicles passing through Max Q.

Speaker 12 (01:36:16):

Terminates.

Speaker 6 (01:36:23):

Terminates received.

Carolina Grossman (01:36:39):

And as you might have seen, there appears to have been an anomaly with the vehicle in flight. And we will first inform us, ensure that our team and others are safe. We take great safety precautions to ensure that no one was put in danger by an event like this. It does look like we got about two and a half minutes of flight data, which will be incredibly helpful as we make improvements to our next vehicle on our way to reaching orbit and any flight where we get some data that we can learn from is a successful one in our mind. Although we, although we did not achieve our primary objective today, our team will work hard to determine what happened here. And as we dig into the flight data, we are optimistic about the future and our next attempt.

Thomas Burghardt (01:37:25):

Let’s go ahead to some quick words from Astra’s founder and CEO, Chris Kemp

Chris Kemp (01:37:44):

Today, after a successful launch and liftoff Astra’s launch vehicle experienced and anomaly in flight, while we regret that we were unable to accomplish all mission objectives for the space force, our team captured a tremendous amount of data from the flight. We will work closely with the FAA to complete a mishap investigation. The high knee is LV0007, which will be updated based on what we learned from the flight. So we can begin servicing our backlog over 50 contracted launches. I think our team here at Astra, our partners at the Pacific Spaceport Complex, and I also want to thank our government customers and partners, the Department of Defense, the United States Space Force, the Defense Innovation Unit, FAA, FCC, the Coast Guard, and the community of Kodiak, Alaska. We look forward to seeing you at our next launch .

Thomas Burghardt (01:38:28):

For now, that is going to conclude our live coverage of the LV0006, mission. I want to give a big thank you to Astra for allowing us to be very transparent about today's test flight and just a big thank you for today's partnership and bringing live coverage of the mission. A big thank you to you Carolina for joining me as well

Carolina Grossman (01:38:46):

Thanks Thomas. Not what we were hoping for today, but thanks for having us. And we hope to be back on the pad again soon.

Thomas Burghardt (01:38:53):

Absolutely. From all of us in NASASpaceFlight, well-wishes to the Astra team, hoping to see them back on the pad soon for all of you watching. Thank you so much for joining us. Stay tuned for more spaceflight news coverage, until next time see you then.

PART 4 OF 4 ENDS [01:40:07]