I am the launch director for the launch services program and so it sounds like a pretty cool job it does it is EGS program chief engineer.

they're fine no constraints to launch

[Music]

and liftoff

now passing through max Q maximum

dynamic pressure

welcome to space welcome to the rocket

ranch I am Amanda Griffin

earlier this month our host Joshua Santora sat down with two launch services program powerhouses Mick
Waltman and Tim Dunn between the two of them I'm pretty sure they could power a rocket with their charisma alone and they have nearly four decades of launch services experience between them to boot since the recording of this interview the icesat-2 mission successfully launched on the last Delta - and the launch services program is now 5 for 5 on successful missions this year with the six still to come needless to say these guys are pretty busy so let's get on with the rocket roundup today I am in the booth and
joined by Tim Dunn and Mick Waltman of NASA's launch services program:

Good day gentlemen I want to let you guys introduce yourselves briefly tell us a little bit about yourselves and kind of what your role is for NASA.

well Joshua thanks for having us today my name is Tim Dunn and I am the launch director for the launch services program and so sounds like a pretty cool job it does it one of the coolest gosh make it's been almost 18 years almost 18 for both of us students thought we started it launchers from about the same time.
same year I think it was in 2000 we both joined NASA's launch services program ironically we both joined in the electrical avionics branch and a couple years in that branch we both moved over and became vehicle systems engineers and just recently probably in the last five years we kind of split our ways Tim went to the launch managers office and I went to the fleet systems management area there for myself on Mik Waltman I'm the chief of fleet systems and integration in the program my branch is in charge of all the system engineering for the launch vehicles another cool job not
quite as cool as the launch manager but it's pretty good it's pretty cool because we get to do all the engineering and assessments of all the launch vehicles that launch services program works with so you guys are both with the launch services program or LSP and you guys I would describe you guys it's kind of the some heroes of NASA and spaceflight for two decades now I'm expecting that people are surprised to hear you've been around for 20 years because my expectation is people would say well
I've heard of the shuttle program. I've heard of maybe SLS. I've heard of SpaceX, and Virgin Galactic and Boeing and all these other companies that are out there.

LSP: What who are you and what do you do so so give me an overview of like what do you guys do as a program so I would say as a program that's named launch services program we have only been around since 1998 so this is our 20th year however the heritage of LSP really dates back into the late 50s and 60s so our predecessor organization that was located here at Kennedy Space Center was
called NASA expendable launch vehicles

okay so you know not a real jazzy name

we need to tighten that up sure

then we had a lot of expertise in

expendable launch vehicles that were located at Goddard Space Flight Center

and at the time Louis was right

I just know Glenn okay right so in

1998 NASA as an agency co-located all of that expertise in expendable launch vehicles here at Kennedy Space Center

and gave us the new branded name of launch services program so what we do

right you know in just very short amount

of time if I could summarize it it would

00:04:05,300 --> 00:04:12,020
be we match up the needs of spacecraft

00:04:08,530 --> 00:04:14,840
with the right size of the rocket so

00:04:12,020 --> 00:04:16,970
small spacecraft do in low Earth orbit

00:04:14,840 --> 00:04:19,939
activity small rocket and we don't just

00:04:16,970 --> 00:04:22,340
have one rocket we find what's best

00:04:19,939 --> 00:04:23,689
needed for the spacecraft customer to

00:04:22,339 --> 00:04:25,369
going them where they need and if that

00:04:25,370 --> 00:04:31,040
requires an ALICE five we do that that

00:04:28,000 --> 00:04:28,000
requires a delta 2 we do that Pegasus or

00:04:25,370 --> 00:04:31,040
Falcon 9 or a falcon 9 heavy delta 4

00:04:28,000 --> 00:04:34,430
heavy we have those all available to us

00:04:31,040 --> 00:04:36,170
to choose from as launch services

00:04:34,430 --> 00:04:38,180
program we have expertise in all those

00:04:36,170 --> 00:04:40,370
vehicles working with our contractors on
those we assess all that and
determine what's needed so you could you
could kind of say we broker right where
the core where NASA's bridge to space if
you will yeah with our spacecraft
customer providing them or
now what's unique about that and we can
talk a little bit about this is compared
to all the other programs people have
heard about shuttle SLS all these launch
services program we work with private
contractors who build rockets so the
United Launch alliances the Northrop
Grumman innovation systems basic basic
technology is you know and they actually own and build and have done a lot of the design of these Rockets although some of the technology and stuffs been around for many many years they build these rockets we then work with them to make sure we have the right rocket for the right mission to make mission success and a lot of us as you heard from Tim and I Tim started back with McDonnell Douglas on the Delta myself with Gd Lockheed on Atlas we have a lot of background in those type of things
and we came to NASA to help do that so
that's one of the big differences that
you probably why people didn't know
about launch services program early on
when shuttle was flying and stuff was is
we are kind of brokering that with our
private contractors yeah to get NASA's
missions on orbit and one good thing
that we like to tout for the taxpayers
out there is that because we have this
those that will be paying tax we have
this stable of rockets in our catalog
and so we're able to compete our needs
against these multiple commercial
providers awesome and thus get the best product and price awesome for the American taxpayer yeah and what's what's unique about that is is being rocket engineers that we are I'm probably dating myself here but all of us have a poster of all of our favorite Rockets you know that are in our offices and things like that but you know we kind of have that that centerfold picture if you taped up in our office of what our favorites are it's true it's a some really nerdy and geeky like you know that right like we are like you are we have no qualms about telling you that we
are that's good you know our our program

manager Amanda Matz kovitch we just

recently did some work and she was
telling somebody that you know if you
really want to see my folks and how

passionate about they are how they are
about their jobs just go ask them what
their hobbies are when they leave
work you know they work on Rockets all
day long and they love it but then they
leave work and go ask him what they do a
lot of us go play golf a lot of us do
model rockets a lot of us do engineering
things we work with outreach
it's just what we like to do we yes we

know we're nerdy and we love rockets so

you guys did you guys grow up as NASA or

space kids or is that something that

really like it didn't happen until you

got close to that launch so I guess I

would say what Tim and I have learned

working with each over each other over

the years is and you can jump in here is

we actually had very similar ideals and

dreams growing up one of my favorite

shows growing up was a Star Trek the

original unfortunately you you will hear

Tim wanted to be a certain character I
believe his name was Captain Kirk

Captain Kirk who didn't want to be

captain critical question well that was

me I wanted to be Scotty so I think it

worked out great because I wanted to do

engineering Tim became the launch

manager you know he runs the launch but

yeah we both loved Star Trek

yeah mama model rock model rockets which

by the way we still do today with

students and outreach and stuff when we

get asked you can't keep us away from

doing either air rockets or model

rockets Tim and I love to go out and do
those still even as we are still

00:08:31,079 --> 00:08:37,199
youngsters at heart so yeah so yeah we

00:08:35,009 --> 00:08:40,769
had a lot of the same things growing up

00:08:37,200 --> 00:08:44,310
that that led us to this job really neat

00:08:40,769 --> 00:08:47,309
job so a little bit about myself I was

00:08:44,309 --> 00:08:48,689
born and raised in Alabama small town I

00:08:47,309 --> 00:08:51,208
went to school at the University of

00:08:48,690 --> 00:08:53,190
Alabama got an engineering degree the

00:08:51,208 --> 00:08:54,929
Air Force offered to pay for my

00:08:53,190 --> 00:08:57,240
schooling so I owed them a few years I

00:08:54,929 --> 00:08:58,949
went off and I flew satellites with the

00:08:57,240 --> 00:09:01,139
United States Air Force for a number of

00:08:58,950 --> 00:09:03,900
years Air Force was really good to me

00:09:01,139 --> 00:09:06,659
after that really cool first assignment

00:09:03,899 --> 00:09:08,879
flying satellites GPS satellites by the
way I got to go back to graduate school
got a graduate degree in orbital mechanics and the physics of space
science and I parlayed that into an assignment here in Florida at Kennedy Space Center and Cape Canaveral Air Force
station I was on an Air Force launch crew and then I once you get launching your blood Mick
what happened absolutely it stays in your blood so you couldn't leave Brevard County I couldn't leave Kennedy Space Center and Cape Canaveral and Here I am
I was very fortunate to get a follow-on job offer from McDonnell Douglas did a little bit of work with the Delta 2 rocket I grew up actually here in Florida and kind of bounced around a little bit but ended up in Tennessee with my dad travel in the southeast area so we did most of my stuff there in Tennessee I went to Tennessee Technological University for my electrical engineering degree started my masters in engineering management and electrical at the University of Tennessee go Vols sorry about the
Alabama there and then came to Florida

and finished that up here at UCF so a little bit of mixture in college life

but you know enjoyed my engineering time

they're a lot like Tim he went in the Air Force I came right out of college

and went to work for the Department of Energy in Tennessee designing guidance

chips for submarine missiles and then I got picked up by General Dynamics Marc

Marietta Lockheed Martin that whole merger after shuttle Challenger and started working at complex 36 here at Cape Canaveral Air Force Station and
like Tim said once you get that first launch in your blood you want to do that

and so I did and fortunate enough we're still launching rockets still loving it

working with the people we love and doing what we dream of every day so very similar career paths as you can see yeah

although mik does wear that it's just a little bit and I wear that much more palateable trainers in red yeah yeah we have a fun time with our SEC football

when Tim and I started working together in LSP in 2000 we kind of found that bond that you know we had even though approach this from different tracks if
you will or different ways we came to the same job of what we love to do and still love to do today yes absolutely

that's awesome

so know humans for launch services

program as part of a spacecraft correct

correct

but pretty much every or I guess barring a few that flew on shuttle every NASA science mission since the inception another program in 99 98 is all LSP is that accurate I would say about 95 98 percent there are some occasional missions that will fly as rideshare on
maybe an Air Force launch or National Reconnaissance launch some have flown as rideshare on Soyuz missions and are then attached to the international space station but certainly anything that's large and is doing big science either here in Earth orbit or going interplanetary you can bet there was an LSP stamp on it if it's launched in the last 20 years yes awesome so tell me about kind of so obviously have a finite number of rockets available as your ride there's not an exponential number out there so
what's the landscape looked like as far

as the options that you've had

historically and and are we seeing a

change now it feels like there's a

growing market in the in the commercial

world absolutely growing market and

again LSP is I would say out front in

looking at the market and some of our

venture class our next some of our new

competitors or or emerging rockets that

are coming up in out that you hear out

there LSP is looking at those and

working with them we we're always trying

to strategically think ahead of what's


the next best thing for NASA

00:13:07,519 --> 00:13:11,929
you know our science missions so people

00:13:10,009 --> 00:13:14,480
have probably seen Blue Origin you know

00:13:11,929 --> 00:13:16,479
or if they haven't they will soon you

00:13:14,480 --> 00:13:20,389
know are they will soon yeah and or

00:13:16,480 --> 00:13:24,259
rocket rocket labs right and launcher

00:13:20,389 --> 00:13:26,990
one started Firefly and we're working

00:13:24,259 --> 00:13:28,519
with these companies to understand their

00:13:26,990 --> 00:13:31,430
rockets to look at how they're doing

00:13:28,519 --> 00:13:34,309
business and and eventually maybe get

00:13:31,429 --> 00:13:36,319
them in as part of our catalog but you

00:13:34,309 --> 00:13:38,509
got to start somewhere and we have a lot

00:13:36,320 --> 00:13:41,540
of stuff coming down the pike a lot like

00:13:38,509 --> 00:13:44,389
people know SpaceX writes true when

00:13:41,539 --> 00:13:46,849
SpaceX first came on the scene which I
can't believe has now been almost in

eleven years ten sixteen years it's been

a long time mm yeah but we think of them

as just starting out right but they when

they first started out we got involved

with them and following their early

launches and and looking at them and

then eventually SpaceX became one of the

Rockets we had available for our our

customers so I mean I think we're always

out there looking at the market and

creating new opportunities yeah I think

historically kind of as Mick and I were

coming up through the 80s and early 90s
there was generally like a smaller rockets some medium Rockets and then the bigger Rockets so Mick and I kind of grew up as we've talked about there was Pegasus has been around since I guess was that late 80s and early 90s and that's a very small market and then Delta 2 was in that kind of medium class Atlas and then the big rockets were Titan 4 and then Space Shuttle yeah so now and so we got to see the evolution of Atlas 5 and Delta for that that design was during our time right - to meet some bigger payloads when Titan
went away so those were kind of our stable while we were growing up yeah so we were able to kind of see Titan be retired but lockheed-martin grow the Atlas - at the time into the Atlas 3 and then now Atlas 5 which has become just an absolute gold standard and launching and for large spacecraft and we got to see you know I just thought about this is we get we got to see companies who you know he worked for McDonnell Douglas I worked for Lockheed Martin and and you got to see these companies get together also inform in this case United Launch
Alliance so you had two rocky companies

who got together and created one and

kind of merged technologies and and

Rockets together to create another

family right and they're even moving

forward with the Vulcan rocket that's

coming out their new design and Northrop

Grumman started with their small Pegasus

they've built an ant Ari's vehicle that

we we have and look at and they're now

looking at another vehicle cars

oh man mega yeah larger rockets so Ellis

market is continuing to grow as mick

said you know we keep building

relationships with all of these emerging
launch service

and rocket providers and look forward to

that first launch for Blue Origin here

in a few years actually going back a

little history wise I'm like I'm excited

about that one because they're launching

gonna be launching off a complex 36 ok

Jude earlier which is where I started my

career launching Atlas rockets which got

decommissioned and Blue Origin moved in

and start rebuilding and to that point

also back just recently July 12th of

2018 complex Space Launch Complex 17 was

taken down where Delta twos launched out
of for many many years and now that's
look that's being repurposed by another
launch come right correct to do so it's
exciting for Tim and I to see some of
these changes and how the market evolves
from there big big year anniversary year
for you all congratulations to the
program into you guys thank you any
place a huge year I don't know that
there's ever been a year with this many
launches this close together talk a
little bit about kind of this year for
you guys as a program well I'm gonna I'm
gonna jump in real quick cuz I'll let
Tim talk about the year but I will say it's an exciting year for us it's our 20th anniversary we're so happy to be here and for all the years we've been with the program this is one of the busiest years we have and let you talk about that so for just a moment let me kind of summarize 2018 and then I want to go on Joshua I'm not sure how much time you have because I can talk for a long we both of - we could talk all Rockside you know - what's exciting about 2018 is that we're launching on six different rocket configurations yeah
so we're launching on a couple of Atlas

5 configurations we mentioned Falcon

9 launch tests we're launching on

Pegasus we're launching on the delta 4

heavy and finally next up for us is the

Delta - yeah so Nick and I are both

individually blessed to be in the

positions that we are absolutely

absolutely love our jobs but I would say

our program launch services program here

at Kennedy Space Center

I mean we're blessed to have the job

that the government has entrusted to us

yeah we're a family I refer to it

sometimes as a dysfunctional family but
we're still but we're still a family I'm very successful dysfunction absolutely we are we love working with everybody we have so we are Tim's right we're blessed to be around so through our 20 year history we've had very busy years and we may have had a year or two as busy as this year but 2018 is particularly busy for us six launches this year we're very fortunate here we are and we've had four of our six launches successfully occurred a lot of tremendous amount of work have gone into those launches in a
couple historic ones too I mean there is

story what have you got for a second

that we've only attempted four so far so

we have four successful out of four

attempts well to go for with two more to

go yeah so you're right I wouldn't say

attempted we actually launched like we

only launched four of the six and

hopefully we're going to talk about the

other two but you know I was saying

historic year for us too Tim Tim and I

like to talk about as one in particular

starting off the year was our goes our

satellite which was the follow that I
mean goes s you're right which was a

follow on to goes our right that we've
done here before which is the new

weather satellite all first-of-its-kind

bringing all kinds of data back for

weather and scientists and then insight

which was a very historic launch for us

it was our first Mars mission off of the

west coast out of Vandenberg Air Force

Base and then recently we had the Tesla

that's true we launched for the second
time as a program off of a Falcon 9

tests which is a really cool satellite

that's out there in space right now
looking for other earth-like planets is

00:19:53,979 --> 00:19:58,389
equal to Kepler absolutely yes do some

00:19:57,098 --> 00:19:59,618
homework there's some cool science out

00:19:58,388 --> 00:20:01,058
there happening right now and then the

00:19:59,618 --> 00:20:03,189
one and then the one we just launched

00:20:01,058 --> 00:20:05,288
which was a lot of work for the team and

00:20:03,190 --> 00:20:07,328
as soon as so we're so proud of the

00:20:05,288 --> 00:20:09,459
program how much effort was put in by

00:20:07,328 --> 00:20:12,190
him every buy was that so hard

00:20:09,459 --> 00:20:17,889
what rocket was that that was a delta 4

00:20:12,190 --> 00:20:19,298
heavy heavy first one for LSP launch

00:20:17,888 --> 00:20:21,939
versus program

00:20:19,298 --> 00:20:24,489
heavy mission and we launched a

00:20:21,940 --> 00:20:26,140
satellite Parker Solar Probe now named

00:20:24,489 --> 00:20:28,329
after dr. Eugene Parker
who first time NASA's ever done that is
	named a satellite after somebody who's

there for the launch

and so excited to see that go but that

was a historic mission to because on its

way to the Sun yeah mission it's going

to quote touch touch we're very excited

about that but let's talk for a moment

about delta 4 heavy our first launch as

a program on that rock yeah it was a

huge rocket it's like it's hard to

describe how big this rocket is and the

the incredible team that United Launch

Alliance has them that has put together
designed and prepares that rocket for launch yeah it is I mean you think about it compared to some of the other rockets and our stable right delta 4 heavy has three common booster cores yeah so there's the extra work that has to go in there and integrating three cores together to lift off from earth the exact same time three core so think of three rock sitting side by side tied together on the launch pad as the first stage each one with its own engine and a engine that provides a lot of power to
get out of Earth's atmosphere but yeah

like Tim said that trying to integrate

all that together which is just the

first stage right and what we when we

call a first stage that's just the part

of the rocket that we use to get out of

Earth's atmosphere it's a it's just the

first basic part the in our case the

power lots of power its provide us that

velocity and speed to leave Earth's

orbit and then of course we have a

second stage which is sitting on top of

that first stage which we refer to as a

booster but the second stage is a small

booster

booster
motor and not really small for Delta for

00:22:02,289 --> 00:22:06,279
I shouldn't say that right it's actually

00:22:03,730 --> 00:22:08,620
a pretty large Delta cryogenic separate

00:22:06,279 --> 00:22:11,950
second stage which uses high-performance

00:22:08,619 --> 00:22:13,899
fuels and to get the spacecraft on its

00:22:11,950 --> 00:22:15,940
way once it's into its intermediate

00:22:13,900 --> 00:22:18,310
orbit and then a mission unique thing a

00:22:15,940 --> 00:22:21,279
thing we did specifically for delta 4

00:22:18,309 --> 00:22:23,289
heavy was we added a third stage solid

00:22:21,279 --> 00:22:25,720
rocket motor we don't fly many third

00:22:23,289 --> 00:22:28,240
stages but this solid rocket motor that

00:22:25,720 --> 00:22:30,370
we've had great heritage with northrop

00:22:28,240 --> 00:22:32,799
grumman designed and developed this

00:22:30,369 --> 00:22:35,739
third stage and that was the the final

00:22:32,799 --> 00:22:38,529
push that parker Solar Probe needed to
get it on that intersecting orbit with
the Sun
incredible mission you were saying do
your homework on some of the others I'm
sure a lot of people out there that are
listening to us today have seen that in
the news and I would say go check that
out because it's a real exciting
missioning 60 years in the making to do
something like this to get this close to
the Sun yeah we covered a good bid that
content with Nicky Fox dr. Nikki Fox
yeah I want to make sure we we touch on
these last two so yes still to come we
have we have the final Delta 2 mission

the little brother I'll call it up the

Delta 4 and then icon on board a Pegasus

so give us a real quick kind of a snapshot those two launches look like

I'm gonna let Tim I'm gonna do Pegasus

first because as you said the Delta 2 is our final Delta to launch and both of us have a lot of history with the Delta 2

but Tim has you heard from his background

James Air Force early on Tim has a tremendous amount of that and this will be an emotional emotional rocket launch

be an emotional emotional rocket launch
for him and so I'll let him talk the

Delta 2 but to correct you just a moment

when you said little brother of Delta 4

and Tim made agree or disagree I don't

know but I would say actually I think

Delta 4 was the evolved brother he might

be a little bigger a little more stout

Delta 4 was the evolved little brother

when he don't diffuse Wow the family

tree in a certain way you might call

Delta 4 the grandchild but on that note

I'll pop this is really quick icon

mission which is our honest fear mission

that's coming up it will be our last
mission of the year is launching on a

Pegasus XL launch vehicle which is a

unique airdrop vehicle that we actually

mount to the bottom of a modified l-1011

aircraft an airplane which is a more or

less a commercial it was a plane it was

a commercial plane you know for us Josh

that's older guys we remember the l-1011

for you is locking advice for you

I would compare that to you know us the

new Boeing you know 767 oh but but the

l-1011 was a mighty plane wide-body

plane that was used for transporting

folks all over the world back in his day

but Northrop Grumman innovation systems
took a an L-1011 and modified it to be able to put this Pegasus XL rocket under the belly of the plane the plane actually is called Stargazer and so stargazer takes Pegasus and we lift off we go to 39,000 feet and once we're at 39,000 feet and Tim as launch manager and the launch team give the go for launch we drop the L we dropped the Pegasus five seconds later it auto ignites itself and heads off into space to deliver Ikon on its way for its science so we're really excited about that mission it's we always liked
working with Pegasus it's a it's a as

Tim likes to say it's my smaller brother

asked you two quick questions about that

mission and the Pegasus in general how

big is the Pegasus compared to that

commercial plane just to get people a

feeling for how big it is and why launch

from an airplane like that seems like a

really weird thing why not just do it

like every other rocket and go from the

ground so so airdrop has some advantages

for smaller payloads and that's what

Pegasus is Right thousand kilograms or

less type of payload and you can you can
put a smaller payload on there science

payload and use the l-1011 instead of

having it launched from the ground you

can get to 39,000 feet and give it a

little bit of early start if you will

right to get out of Earth's atmosphere

right so you're at 39,000 feet so you

don't need quite as much energy in your

fuels and your boost to get out of the

Earth's atmosphere and go so that's one

of the advantages to the smaller rocket

on the l-1011 the airdrop vehicle right

Tim we'll talk a little bit about Delta

2 and some of the solids and stuff we

Tim we'll talk a little bit about Delta
need to put on here but that's one of

671
00:26:44,460 --> 00:26:48,870
the advantages other advantage is what

672
00:26:46,710 --> 00:26:50,490
play exists the most in the summertime

673
00:26:48,869 --> 00:26:52,109
Florida weather

674
00:26:50,490 --> 00:26:54,319
yeah weather well guess what happens

675
00:26:52,109 --> 00:26:56,449
when you fly to 39,000 feet

676
00:26:54,319 --> 00:26:58,099
not so much weather

677
00:26:56,450 --> 00:27:00,710
the biggest thing you have to deal with

678
00:26:58,099 --> 00:27:02,839
at 39,000 feet is the temperature and so

679
00:27:00,710 --> 00:27:04,789
we designed the rocket and and all the

680
00:27:02,839 --> 00:27:07,129
components to meet that cold temperature

681
00:27:04,789 --> 00:27:08,539
while you're cruising at 39,000 feet so

682
00:27:07,130 --> 00:27:10,700
Tim's absolutely right you you pretty

683
00:27:08,539 --> 00:27:13,759
much take the weather out of the

684
00:27:10,700 --> 00:27:15,980
equation for launch day right right
because the Pegasus okay so the Pegasus is actually only 50 inches in diameter

just over four feet just over four feet

50 inches in diameter

underneath the l-1011 right and the length of the Pegasus is about mmm would that be about 42 feet 42 to 50 feet I always try to in my mind always remember 5050 but it's actually a little bit less than 50 feet long with a delta wing on it so it's a pretty small rocket I mean I don't want to take away from it it's a mighty rocket of what it's designed to
do for but compared to a delta ii or an
atlas v or a delta 4 heavy or a falcon 9
it's it's small in diameter and
small in length right so you think of
that 50 less than 50 feet long and 50
inches in diameter and the wingspan of
an l-1011 is about two to two and a half
times that okay right so you're looking
a hundred and fifty feet roughly hundred
two so it they give you an idea of the
wingspan and how that sits underneath
the belly of the of the l-1011 but very
important Northrop Grumman has been
doing this for years this will be our
44th Pegasus Northrop Grumman is launched I believe that's correct and we're really excited and getting that off the ground but but our next one out yeah our NASA two which is always the most father a most hip forward which is always the most important one is next which it's which whatever is next is the most important one and that I'm gonna I'm gonna turn that over to Tim because it is a very special rocket and we have a lot of heritage with it so next up for launch services program we're gonna launch the
final delta ii and the payload there is

728
00:28:50,000 --> 00:28:55,220
i set two and it will be the final

729
00:28:52,880 --> 00:28:57,080
launch so we are in our 30th year of

730
00:28:55,220 --> 00:28:59,779
flight with the delta ii launch vehicle

731
00:28:57,079 --> 00:29:05,240
it's had its debut flight on Valentine's

732
00:28:59,779 --> 00:29:08,210
Day February 14 1989 and so it's a it's

733
00:29:05,240 --> 00:29:09,579
a has become known as the industry

734
00:29:08,210 --> 00:29:12,700
workhorse

735
00:29:09,579 --> 00:29:15,909
Delta 2 is not a huge rocket it's in

736
00:29:12,700 --> 00:29:17,470
itself it's not tiny but it's not tights

737
00:29:15,910 --> 00:29:23,560
it's yeah it's only eight feet in

738
00:29:17,470 --> 00:29:25,180
diameter yeah it's it's we call we refer

739
00:29:23,559 --> 00:29:27,369
to it as a medium class rocket but now

740
00:29:25,180 --> 00:29:29,440
it's a it's a mighty workhorse and has

741
00:29:27,369 --> 00:29:31,089
been for NASA special about Delta 2 is
this is gonna be the hundred and fifty

fifth flight and the final one for Delta two and it kind of created its own market in that medium class of launch vehicles because it became known as that workhorse that dependable reliable relatively low-cost launcher and so our spacecraft a lot on the science side decided back in the early 90s let's just design our spacecraft to fit on Delta 2 so it kind of grew its own class and size of spacecraft market which I want to get into that some more in a little bit but that's very backwards of how
most everything else works for you guys

Kurt right correct

right so we'll come back to that that's

really interesting yeah what and and to

just kind of elaborate on that one of

the things that was unique about Delta 2

back in the 80s when it came around it

was a it was a big block buy or what

that means is they bought a lot of

rockets the Air Force did and Tim was

part of that in the with their GPS

satellites way back then and that kind

of got things going but like Tim said

they started designing the satellites to
fit on the rocket so little backwards

and what we normally do but it worked

yeah nASA has benefited greatly from the

Delta heritage of launch vehicles dating

back to 1960 in Delta 1 but focusing on

Delta 2 the Air Force we have to we'll

take a moment here and pay homage to our

partners the United States Air Force if

not for them sure Delta the fleet could

have easily been retired in about 1986

yeah actually production on Delta

vehicles was halted it was 1981 because

if you recall what happened in that year

or that time frame was shuttle started

00:30:36,819 --> 00:30:40,539

00:30:40,539 --> 00:30:45,940

00:30:43,509 --> 00:30:49,359

00:30:45,940 --> 00:30:52,779

00:30:49,359 --> 00:31:00,789

00:30:52,779 --> 00:30:57,639

00:30:55,240 --> 00:31:06,789

00:30:57,640 --> 00:31:04,300

00:31:00,789 --> 00:31:06,789

00:31:04,299 --> 00:31:10,480

00:31:06,789 --> 00:31:12,190

00:31:09,090 --> 00:31:17,440

00:31:12,190 --> 00:31:14,710

00:31:14,710 --> 00:31:19,090
from yeah and the government said we are
go to deploy all commercial

satellites from shuttle and the Air

Force meanwhile had

Atlas the Atlas one in the Atlas do this

was coming online they also had Titan so

they really didn't need the Delta

anymore but the in missional was

supposed to be flying space shuttle was

he almost exactly just delivering Palin

after payload multiple times it was

supposed to it was referred to as the

semi truck of space right it was

supposed to deliver a lot of things on

orbit and they all that and then in 1986
Ronald Reagan declared that you know we wouldn't launch commercial satellites on shuttle anymore sure so Delta so the Animas Air Force needed to get these newly developed Global Positioning satellites on orbit previously they were going to fly on the shuttle now they're being manifested on expendable launch vehicles the Air Force said hey let's go redesign the last version of the Delta one let's call it Delta two let's upgrade it make it a little beefier launch bigger payloads they provided that
infrastructure here at Cape Canaveral Air Force Station in complex 17 and so it was kind of on that foundation that the nasa science community was able to leverage and say wow let's go back to delta with the slightly smaller spacecraft for science purpose so it is the final delta ii for us as LSP for the production of delta ii out of space launch complex-2 out of Vandenberg but you know and why I said earlier it's a little emotional for Tim it's not only the end of an era for delta ii but you know this is the third time Tim's had to
say goodbye to Delta - yeah so I know I

haven't had a lot of experience cuz I'm

not as uh as invested in the history of

NASA but I know that there were a few

years ago. we

Delta twos were gone and all of a sudden

Delta twos were back so so NASA in

September of 2011 we launched the Grail

mission off of 17b which was the last

supposed to be the last Delta - right

and on the East Coast from the East

Coast we had a month later we went out

west to Vandenberg to launch the NPP

mission which was the absolute final
last one the last one ever right and so

00:33:29,710 --> 00:33:34,240
and and and no.9 was the nav star

00:33:32,440 --> 00:33:36,289
mission which was an Air Force mission

00:33:34,240 --> 00:33:38,420
on 17a and that was

00:33:36,289 --> 00:33:39,920
the last mission off 17 a so 17 a and B

00:33:38,420 --> 00:33:43,759
were decommissioned on the East Coast

00:33:39,920 --> 00:33:46,460
okay and then NPP last launch off of

00:33:43,759 --> 00:33:48,079
space launch complex-2 so Jim you know

00:33:46,460 --> 00:33:50,990
Tim had to say goodbye during all that

00:33:48,079 --> 00:33:53,389
time and then a few years later it's

00:33:50,990 --> 00:33:55,430
right in ula United Launch Alliance who

00:33:53,390 --> 00:34:00,130
builds the Delta line and the Atlas line

00:33:55,430 --> 00:34:04,759
they said but wait we have a few more

00:34:00,130 --> 00:34:06,350
and NASA had four science missions that

00:34:04,759 --> 00:34:10,789
had just come out and been approved
right the oco-2 mission the SMAP mission
which is soil moisture mission the Jaypee ss1 mission whether says weather satellite that we just launched recently and and of course icesat-2 and they all approach lung services program and they're all within the delta ii range of way garment requirements and so NASA turned ula on to manufacture the last four Delta Delta twos and that's where we are today so I can honestly say that there are no more parts left the there's always a few extra time they're there United Launch Alliance does have some
parts out there for our fifth vehicle but I believe it will find its way to some other areas so I can probably with 99.9% certainty say icesat-2 is the final awesome hey guys we need to wrap it up I wanted to ask you to give me a little bit of feedback kind of your opinion if you could leave people with one piece of knowledge or understanding about what LSP does about how important it is what would you say Wow Joshua I would say that launch services program is the government
organization that provides the mission assurance capability the analytical capability

that gives us the best chance that we're going to have a hundred percent mission success for whatever science or robotic spacecraft we're about to launch we have some of the finest engineers and analysts worldwide it's just amazing when Mick and I get to walk the halls of LSP on a daily basis the people that we interact with and that have been assembled and everyone is just so enthusiastic about doing the job doing
it right and just absolutely loves

Rockets loves the spacecraft loves the fact that they're part of something

special for humankind yeah I totally agree Tim I think launchers problem we have some folks that are just world-renowned people that are called upon by other agencies called on by other contractors sometimes to provide input we we have a great team and when I say team it's it's really I heard too it earlier it's a family I mean the whole LSP program from the top down is a family and the other thing I would say is everybody we work with that I I know
is so passionate about their jobs and what we do and making history because that's what we feel like we do is every day working for NASA working on some of NASA's most important scientific and robotic missions we make history doing that right it's just exciting for us to get to do that our number one job is to make sure our spacecraft customers meet their requirements and get on orbit successfully exactly where they need to be on the specific orbit they need to get their science done and and we do not take that lightly in launch services.
program that is part of our mission is to open up the universe you know for our space for our people and spacecraft to get things done and and yeah we talk Rockets all day long but we're in it to make sure our spacecraft customer succeeds awesome well Tim mink thanks for being in booth with me today thanks thanks to his phone it was a blast and good luck with Delta 2 good luck with Ikon and good luck with the future of science and space after recording this podcast our host
Joshua Santoro had the honor of being the launch commentator for the last Delta to fly out this historic launch on September 15th was a great success and will hold a special place in the hearts of Tim Dunn and Nick Waldman Green is.

great ten nine eight seven six five four

three two one liftoff of the final delta to launching nearly three decades of science research and exploration missions lifting icesat-2 on a quest to explore the polar ice sheets of our constantly changing home planet.

Godspeed delta ii and thank you for your
almost 30 years of unparalleled excellence you all made this look easy

this is rocket science it is not easy

but the team looks like they just did a great job pulling together today but on a personal level Tim we know that you love the Delta 2 obviously you are committed to every mission and do a phenomenal job so what's this one for you personally

besides being excited what does it mean to you personally

well obviously I'm a little bit sad I'm thrilled with mission success and that we were able to close the chapter on
Delta 2 with a huge success of an incredibly important science payload. icestat-2 is going to do cutting-edge scientific data gathering the precision measurements it's going to make from space they're just going to be incredible so to be able to say that we launched this very important science mission on the final flight of the industry workhorse is just a huge accomplishment for the entire team and so I have a lot of personal feelings about Delta 2 but I'm really just a very small part of the entire team and I just
proud honored humbled to be part of this team that gets to closed chapter on this incredible rocket I'm Joshua Santora and that's our show thanks for stopping by the rocket range and special thanks to our guests our aspiring Trekkies Waltman and Tim done to learn more about all things rockets go to nasa.gov slash launch services there are also several nasa podcasts you can check out - one more about what's happening at all of our centers at nasa.gov slash podcasts a special shout out to our producer Jessica Wanda Happy Trails to you until
we meet again our sound man Dan Casper

and Frankie Martin editor Michelle stone

and our production manager Amanda

Griffin tune in next month as we wrangle

some ranch hands you may not expect to

find around these parts and remember on

the rocket range even the sky isn't the

limit

[Music]

[Music]

you