



1  
00:00:08,270 --> 00:00:09,530  
Orion is getting

2  
00:00:09,530 --> 00:00:16,530  
ready to launch.  
[ Music ]

3  
00:00:16,900 --> 00:00:23,900  
>> [Background Music]  
My name is Kelly Smith,

4  
00:00:24,780 --> 00:00:27,750  
and I work on navigation  
and guidance for Orion.

5  
00:00:27,750 --> 00:00:30,420  
Orion is NASA's next-generation  
spacecraft.

6  
00:00:30,420 --> 00:00:33,180  
Built with versatility in mind,  
it can take astronauts deeper

7  
00:00:33,180 --> 00:00:35,400  
into space than we've  
ever gone before;

8  
00:00:35,400 --> 00:00:38,300  
to an asteroid or  
even onto Mars.

9  
00:00:38,300 --> 00:00:41,300  
For these missions, Orion has  
to be one tough spacecraft

10  
00:00:41,300 --> 00:00:43,579  
withstanding high speeds,  
searing temperatures

11

00:00:43,579 --> 00:00:46,890

and extreme radiation.

Before we can send

12

00:00:46,890 --> 00:00:50,130

astronauts into space on Orion,  
we have to test all

13

00:00:50,130 --> 00:00:52,340

of its systems,  
and there's only one way to know

14

00:00:52,340 --> 00:00:55,750

if we got it right;  
fly it in space.

15

00:00:55,750 --> 00:00:59,850

For Orion's first flight, no  
astronauts will be aboard.

16

00:00:59,850 --> 00:01:02,110

The spacecraft is loaded  
with sensors to record

17

00:01:02,110 --> 00:01:06,530

and measure all aspects of  
the flight in every detail.

18

00:01:06,530 --> 00:01:09,380

It all begins with the  
launch aboard a Delta Four

19

00:01:09,380 --> 00:01:16,380

heavy rocket.

[ Rocket Launch ]

20

00:01:34,560 --> 00:01:37,729

As it punches into Earth orbit,  
Orion will jettison its

21

00:01:37,729 --> 00:01:41,500

Launch Abort System.

The Abort System is a safety

22

00:01:41,500 --> 00:01:43,429

feature designed to pull Orion  
and its crew out of danger

23

00:01:43,429 --> 00:01:47,440

if there were a problem  
with the rocket during ascent.

24

00:01:47,440 --> 00:01:53,720

Orion's journey is  
just beginning.

25

00:01:53,720 --> 00:01:56,310

As the spacecraft and the upper  
stage begin their first lap

26

00:01:56,310 --> 00:01:59,190

around Earth, Mission Control  
in Houston is monitoring

27

00:01:59,190 --> 00:02:02,890

the progress of the flight.  
Orion's over a hundred

28

00:02:02,890 --> 00:02:07,149

miles up and going  
about 17,000 miles per hour.

29

00:02:07,149 --> 00:02:10,030

Just as it passes  
over the Indian Ocean,

30

00:02:10,030 --> 00:02:17,030

we lose communication.  
This is expected.

31

00:02:18,720 --> 00:02:20,940

The communications link  
we have through satellites

32

00:02:20,940 --> 00:02:24,580

to Orion is momentarily  
lost, but Orion continues

33

00:02:24,580 --> 00:02:28,910

to receive and process data.  
Its computers can handle 480

34

00:02:28,910 --> 00:02:33,690

million instructions per second.  
Imagine you are traveling

35

00:02:33,690 --> 00:02:36,430

with Orion  
as the flight test continues.

36

00:02:36,430 --> 00:02:40,530

One orbit completed, time to go.  
The upper stage of the rocket

37

00:02:40,530 --> 00:02:43,390

fires again like the setup  
for a roller coaster ride;

38

00:02:43,390 --> 00:02:50,390

this is the big climb  
we've been waiting for.

39

00:02:50,600 --> 00:02:55,960

We are headed 3,600 miles  
above Earth, 15 times higher

40

00:02:55,960 --> 00:03:02,810

from the planet than the  
International Space Station.

41

00:03:02,810 --> 00:03:04,520

As we get further  
away from Earth,

42

00:03:04,520 --> 00:03:06,210

we'll pass through  
the Vann Allan Belts,

43

00:03:06,210 --> 00:03:13,210

an area of dangerous radiation.  
Radiation like this can

44

00:03:13,780 --> 00:03:16,260

harm the guidance systems,  
onboard computers, or

45

00:03:16,260 --> 00:03:19,580

other electronics on Orion.  
Naturally, we have to pass

46

00:03:19,580 --> 00:03:25,100

through this danger zone twice,  
once up and once back.

47

00:03:25,100 --> 00:03:29,890

But Orion has protection,  
shielding will be put

48

00:03:29,890 --> 00:03:33,690

to the test as the vehicle cuts  
through the waves of radiation.

49

00:03:33,690 --> 00:03:35,620

Sensors aboard will  
record radiation levels

50

00:03:35,620 --> 00:03:38,250

for scientists to study.  
We must solve these

51

00:03:38,250 --> 00:03:41,700  
challenges before we send people  
through this region of Space.

52

00:03:41,700 --> 00:03:45,640  
For this flight, it's  
time to head home.

53

00:03:45,640 --> 00:03:48,350  
The upper stage of the  
rocket triggers separation.

54

00:03:48,350 --> 00:03:51,490  
Orion's jets fire to turn  
it into the proper position

55

00:03:51,490 --> 00:03:54,440  
to reenter Earth's atmosphere.  
No matter what happens

56

00:03:54,440 --> 00:03:58,940  
now, we're coming in.  
Seventy-five miles above Earth,

57

00:03:58,940 --> 00:04:01,069  
the spacecraft enters  
the atmosphere;

58

00:04:01,069 --> 00:04:03,120  
things happen quickly.  
We're now traveling more

59

00:04:03,120 --> 00:04:06,330  
than 20,000 miles per hour.  
Air particles pushed

60

00:04:06,330 --> 00:04:09,130  
out of the way heat up.  
An envelope of hot plasma

61

00:04:09,130 --> 00:04:12,100  
surrounds the vehicle  
as it plummets towards Earth.

62

00:04:12,100 --> 00:04:15,400  
The plasma reaches temperatures  
of 4,000 degrees Fahrenheit;

63

00:04:15,400 --> 00:04:18,519  
almost twice as hot  
as molten lava.

64

00:04:18,519 --> 00:04:21,590  
This may be the most  
dangerous part of the flight.

65

00:04:21,590 --> 00:04:23,310  
Mission Control is  
monitoring all the data

66

00:04:23,310 --> 00:04:27,770  
from the spacecraft, and then  
we lose communication again.

67

00:04:27,770 --> 00:04:33,710  
No data can penetrate the  
plasma; Orion is on its own.

68

00:04:33,710 --> 00:04:37,800  
Orion is inside a fireball.  
Onboard systems ignite jets to

69

00:04:37,800 --> 00:04:40,969  
keep the ship pointed correctly  
so a specially constructed

70

00:04:40,969 --> 00:04:42,729  
shield takes the full brunt  
of the inferno.

71

00:04:42,729 --> 00:04:46,550

This is the largest heat shield of its kind ever made.

72

00:04:46,550 --> 00:04:48,979

Orion's computers that man the spacecraft have to bank

73

00:04:48,979 --> 00:04:51,279

like an airplane keeping a precise path

74

00:04:51,279 --> 00:04:53,349

to the landing site. Even though we've soared

75

00:04:53,349 --> 00:04:57,060

from 20,000 miles per hour to about 300 miles per hour,

76

00:04:57,060 --> 00:04:59,319

we're still traveling amazingly fast.

77

00:04:59,319 --> 00:05:03,210

We must slow down to safely land in the ocean.

78

00:05:03,210 --> 00:05:08,860

Luckily, we have parachutes. Specially designed for Orion,

79

00:05:08,860 --> 00:05:12,169

the parachutes help us hit the brakes, but not too quickly.

80

00:05:12,169 --> 00:05:15,559

One day people will be aboard so deceleration must happen

81

00:05:15,559 --> 00:05:19,229  
in stages to keep things  
comfortable for the crew.

82

00:05:19,229 --> 00:05:26,229  
The forward bay cover jettisons.  
Two drogue chutes deploy, and

83

00:05:27,979 --> 00:05:33,280  
slow the returning spacecraft  
down to 175 miles per hour.

84

00:05:33,280 --> 00:05:40,080  
[ Background Sounds ]  
Then the three main

85

00:05:40,080 --> 00:05:47,080  
parachutes open.  
Once fully engaged this

86

00:05:47,289 --> 00:05:51,330  
canopy would cover an American  
football field.

87

00:05:51,330 --> 00:05:56,270  
It takes parachutes this size  
and strength to slow our descent

88

00:05:56,270 --> 00:06:01,889  
to 20 miles per hour  
and then splash down.

89

00:06:01,889 --> 00:06:06,259  
For this first flight, we  
won't have astronauts inside,

90

00:06:06,259 --> 00:06:08,909  
but we still had some  
very precious cargo.

91

00:06:08,909 --> 00:06:11,309

The flight data from this mission is stored inside the

92

00:06:11,309 --> 00:06:14,469

Orion Spacecraft.

While our flight might be over,

93

00:06:14,469 --> 00:06:16,349

there is still a lot of work to do.

94

00:06:16,349 --> 00:06:19,069

Onboard sensors recorded every detail from launch,

95

00:06:19,069 --> 00:06:25,639

to flying in space, to reentry, to landing.

96

00:06:25,639 --> 00:06:30,089

[ Music ]

Flight tests are

97

00:06:30,089 --> 00:06:33,020

difficult and complex, but they give us confidence

98

00:06:33,020 --> 00:06:34,839

that the systems we have designed work

99

00:06:34,839 --> 00:06:38,319

under real flight conditions. It's great to be a part of this

100

00:06:38,319 --> 00:06:41,089

first space flight for Orion, and we're looking forward