



1
00:00:06,940 --> 00:00:22,360
Orion is getting ready to launch.

2
00:00:22,360 --> 00:00:26,400
My name is Kelly Smith and I work on navigation and guidance for Orion.

3
00:00:26,400 --> 00:00:29,090
Orion is NASA's next generation spacecraft.

4
00:00:29,090 --> 00:00:32,820
Built with versatility in mind, it can take astronauts deeper into space than we've

5
00:00:32,820 --> 00:00:36,760
ever gone before to an asteroid or even on to Mars

6
00:00:36,760 --> 00:00:40,379
For these missions, Orion has to be one tough spacecraft withstanding high speeds, searing

7
00:00:40,379 --> 00:00:44,989
temperatures, and extreme radiation.

8
00:00:44,989 --> 00:00:49,550
Before we can send astronauts into space on Orion, we have to test all of its systems.

9
00:00:49,550 --> 00:00:54,269
And there's only one way to know if we got it rightÖFLY IT IN SPACE.

10
00:00:54,269 --> 00:00:58,519
For Orion's first flight, no astronauts will be aboard.

11
00:00:58,519 --> 00:01:03,750
The spacecraft is loaded with sensors to record

and measure all aspects of the flight in every

12

00:01:03,750 --> 00:01:05,199

detail.

13

00:01:05,199 --> 00:01:33,230

It all begins with launch aboard a Delta IV Heavy rocket

14

00:01:33,230 --> 00:01:38,590

As it punches into Earth's orbit, Orion will jettison its Launch Abort System.

15

00:01:38,590 --> 00:01:41,797

The abort system is a safety feature designed to pull Orion and its crew out of danger if

16

00:01:41,797 --> 00:01:46,080

there were a problem with the rocket during ascent.

17

00:01:46,080 --> 00:01:52,400

Orion's journey is just beginning.

18

00:01:52,400 --> 00:01:56,811

As the spacecraft and the upper stage make their first lap around Earth, Mission Control

19

00:01:56,811 --> 00:02:00,300

in Houston is monitoring the progress of the flight.

20

00:02:00,300 --> 00:02:05,820

Orion's over a hundred miles up and going about 17,000 mph.

21

00:02:05,820 --> 00:02:11,060

Just as it passes over the Indian Ocean we lose communication.

22

00:02:11,060 --> 00:02:17,400

This is expected.

23

00:02:17,400 --> 00:02:23,250

The communications link we have through satellites to Orion is momentarily lost, but Orion continues

24

00:02:23,250 --> 00:02:25,030

to receive and process data.

25

00:02:25,030 --> 00:02:31,190

Its computers can handle 480 million instructions per second.

26

00:02:31,190 --> 00:02:35,120

Imagine you are traveling with Orion as the flight test continues.

27

00:02:35,120 --> 00:02:36,120

One orbit completed.

28

00:02:36,120 --> 00:02:39,900

Time to go:

The upper stage of the rocket fires again.

29

00:02:39,900 --> 00:02:47,940

Like the set up for a roller coaster ride, this is the big climb we have been waiting

30

00:02:47,940 --> 00:02:49,270

for

31

00:02:49,270 --> 00:02:59,250

We are headed 3,600 miles above Earth's surface, 15 times higher from the planet than the International

32

00:02:59,250 --> 00:03:00,730

Space Station.

33

00:03:00,730 --> 00:03:04,880

KELLY: As we get farther away from Earth,
we'll pass through the Van Allen Belts,

34

00:03:04,880 --> 00:03:11,920

an area of dangerous radiation.

35

00:03:11,920 --> 00:03:15,700

Radiation like this could harm the guidance
systems, onboard computers or other electronics

36

00:03:15,700 --> 00:03:16,840

on Orion.

37

00:03:16,840 --> 00:03:23,810

Naturally, we have to pass through this danger
zone twice once up, once back.

38

00:03:23,810 --> 00:03:27,980

But Orion has protection.

39

00:03:27,980 --> 00:03:32,370

Shielding will be put to the test as the vehicle
cuts through the waves of radiation.

40

00:03:32,370 --> 00:03:36,290

Sensors aboard will record radiation levels
for scientists to study.

41

00:03:36,290 --> 00:03:40,360

We must solve these challenges before we send
people through this region of space.

42

00:03:40,360 --> 00:03:44,319

For this flight, it's time to head home.

43

00:03:44,319 --> 00:03:47,110

The upper stage of the rocket triggers separation.

44

00:03:47,110 --> 00:03:51,830

Orion's jets fire to turn it into the proper position to re-enter Earth's atmosphere.

45

00:03:51,830 --> 00:03:54,390

No matter what happens now, we're coming in.

46

00:03:54,390 --> 00:03:59,890

75 miles above Earth, the spacecraft enters the atmosphere.

47

00:03:59,890 --> 00:04:00,890

Things happen quickly.

48

00:04:00,890 --> 00:04:04,220

We're now traveling more than 20,000 miles per hour.

49

00:04:04,220 --> 00:04:09,040

Air particles pushed out of the way heat up an envelope of hot plasma surrounds the vehicle

50

00:04:09,040 --> 00:04:10,061

as it plummets toward Earth.

51

00:04:10,061 --> 00:04:16,530

The plasma reaches temperatures of 4,000 degrees Fahrenheit, almost twice as hot as molten

52

00:04:16,530 --> 00:04:17,530

lava.

53

00:04:17,530 --> 00:04:20,269

This may be the most dangerous part of the flight.

54

00:04:20,269 --> 00:04:25,350

Mission control is monitoring all the data

from the spacecraft and then we lose communication

55

00:04:25,350 --> 00:04:26,440

again.

56

00:04:26,440 --> 00:04:28,530

No data can penetrate the plasma.

57

00:04:28,530 --> 00:04:32,380

Orion is on its own.

58

00:04:32,380 --> 00:04:35,180

Orion is inside a fireball.

59

00:04:35,180 --> 00:04:39,380

Onboard systems ignite jets to keep the ship pointed correctly, so the specially constructed

60

00:04:39,380 --> 00:04:42,320

heat shield takes the full brunt of the inferno.

61

00:04:42,320 --> 00:04:45,220

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

62

00:04:45,220 --> 00:04:49,570

Orion's computers command the spacecraft to bank like an airplane, keeping a precise

63

00:04:49,570 --> 00:04:51,419

path to the landing site.

64

00:04:51,419 --> 00:04:56,120

Even though we've slowed from 20,000 miles per hour to about 300 miles per hour, we're

65

00:04:56,120 --> 00:04:58,020

still traveling amazingly fast.

66
00:04:58,020 --> 00:05:01,520
We must slow down to safely land in the ocean.

67
00:05:01,520 --> 00:05:06,520
Luckily, we have parachutes.

68
00:05:06,520 --> 00:05:10,830
Specially designed for Orion, the parachutes help us hit the brakes, but not too quickly.

69
00:05:10,830 --> 00:05:18,650
One day people will be aboard, so deceleration must happen in stages to keep things comfortable

70
00:05:18,650 --> 00:05:20,669
for the crew.

71
00:05:20,669 --> 00:05:28,330
The forward bay jettisons two drogue chutes deploy and slow the returning spacecraft down

72
00:05:28,330 --> 00:05:35,490
to 175 miles per hour.

73
00:05:35,490 --> 00:05:44,840
Then, the three main parachutes open.

74
00:05:44,840 --> 00:05:51,530
Once fully engaged, this canopy would cover an American football field.

75
00:05:51,530 --> 00:05:56,860
It takes parachutes this size and strength to slow our descent to 20 miles per hour.

76
00:05:56,860 --> 00:06:00,310
And then splashdown!

77

00:06:00,310 --> 00:06:06,810

For this first flight, we won't have astronauts inside, but we still have some very precious

78

00:06:06,810 --> 00:06:07,810

cargo.

79

00:06:07,810 --> 00:06:11,340

The flight data from this mission is stored inside the Orion spacecraft.

80

00:06:11,340 --> 00:06:15,020

While our flight might be over, there is still a lot of work to do.

81

00:06:15,020 --> 00:06:20,350

Onboard sensors recorded every detail from launch, to flying in space, to reentry, to

82

00:06:20,350 --> 00:06:28,270

landing.

83

00:06:28,270 --> 00:06:32,530

Flight tests are difficult and complex, but they give us confidence that the systems we

84

00:06:32,530 --> 00:06:35,259

have designed work under real flight conditions.