



1
00:00:00,506 --> 00:00:30,866
[Music]

2
00:00:31,366 --> 00:00:32,966
>> This is Gene, and
I'm on the surface.

3
00:00:34,356 --> 00:00:40,886
And as I take man's last step
from the surface back home

4
00:00:42,276 --> 00:00:44,586
for some time to come but
we believe not too long

5
00:00:44,586 --> 00:00:49,296
into the future, I'd like to
just let what I believe history

6
00:00:49,296 --> 00:00:54,066
will record that
America's challenge

7
00:00:54,066 --> 00:00:59,326
of today has forged man's
destiny of tomorrow.

8
00:01:01,366 --> 00:01:05,046
And as we leave the
moon at Taurus-Littrow,

9
00:01:05,046 --> 00:01:10,276
we leave as we came and, God
willing, as we shall return:

10
00:01:10,276 --> 00:01:19,906
With peace and hope
for all mankind.

11

00:01:21,836 --> 00:01:25,476
>> With those words, humans
left the moon for last time.

12
00:01:25,816 --> 00:01:26,946
In fact, it was the time

13
00:01:26,946 --> 00:01:28,526
that humans have
left low-earth orbit.

14
00:01:29,406 --> 00:01:33,866
That was Apollo 17
in December of 1972.

15
00:01:34,306 --> 00:01:36,126
Space exploration is hard.

16
00:01:36,856 --> 00:01:40,226
It was hard when the goal
was to walk on the moon.

17
00:01:40,226 --> 00:01:42,426
It's even harder
now that the goal is

18
00:01:42,426 --> 00:01:43,886
to put footprints on Mars.

19
00:01:44,326 --> 00:01:48,546
Here's a typical
picture of the night sky.

20
00:01:48,906 --> 00:01:51,086
The moon is pretty easy to find.

21
00:01:51,086 --> 00:01:52,536
It's relatively close to us.

22

00:01:52,536 --> 00:01:54,206

It's a journey of
about three days.

23

00:01:55,256 --> 00:01:56,226

Can you find Mars?

24

00:01:56,736 --> 00:01:58,806

If you're looking
at the bright spot

25

00:01:58,806 --> 00:02:01,346

on the lower right-hand
corner, you've found Venus.

26

00:02:02,666 --> 00:02:04,446

Mars is actually here.

27

00:02:05,036 --> 00:02:06,766

It's a small speck
in the night sky.

28

00:02:07,236 --> 00:02:08,596

It's a journey of
about six months.

29

00:02:09,406 --> 00:02:11,206

It's a pretty difficult
target to get to,

30

00:02:11,206 --> 00:02:12,886

especially when you want
to send people there,

31

00:02:12,926 --> 00:02:16,316

but that's exactly what
we're planning to do.

32

00:02:17,406 --> 00:02:20,116

There are many barriers

in getting there,

33

00:02:20,306 --> 00:02:22,706

including technical,
physiological, and political.

34

00:02:23,836 --> 00:02:26,566

But NASA has a plan for human
exploration comprising the

35

00:02:26,566 --> 00:02:28,336

world's largest and
most powerful rocket,

36

00:02:29,266 --> 00:02:30,876

the most capable
human spacecraft,

37

00:02:31,766 --> 00:02:35,166

an upgraded launch facility, and
a mission plan that culminates

38

00:02:35,236 --> 00:02:36,786

in a crewed journey to Mars.

39

00:02:37,906 --> 00:02:40,356

We will, for the first time
since the end of Apollo,

40

00:02:40,616 --> 00:02:42,866

send people away from the
relative safety of Earth

41

00:02:43,426 --> 00:02:50,956

to explore a foreign world.

42

00:02:52,946 --> 00:02:55,726

Apollo launched on the
top of a Saturn V rocket.

43

00:02:55,726 --> 00:02:58,216

And the Saturn V
remains the largest

44

00:02:58,216 --> 00:02:59,916

and most powerful
rocket ever launched.

45

00:03:01,316 --> 00:03:03,666

The rocket that NASA
is currently developing

46

00:03:03,666 --> 00:03:05,886

to launch the Orion
spacecraft is referred

47

00:03:05,886 --> 00:03:08,126

to as the Space Launch
System or the SLS.

48

00:03:09,576 --> 00:03:11,996

To give you an idea of
the size of these rockets,

49

00:03:11,996 --> 00:03:14,546

if you were to put the first
SLS down on a football field,

50

00:03:14,656 --> 00:03:17,706

the bottom of the rocket would
be in one end zone and the top

51

00:03:17,706 --> 00:03:19,316

of the rocket would stretch
someplace the Cleveland Browns

52

00:03:19,316 --> 00:03:19,976

often have trouble finding

53

00:03:20,186 --> 00:03:22,186
[Laughter]

54

00:03:22,356 --> 00:03:23,936
-- the other end zone.

55

00:03:24,856 --> 00:03:26,226
The SLS is being developed

56

00:03:26,226 --> 00:03:27,496
through a block upgrade
approach.

57

00:03:27,806 --> 00:03:30,836
The first SLS for Exploration
Mission 1 is referred

58

00:03:30,836 --> 00:03:31,926
to as Block 1.

59

00:03:32,796 --> 00:03:35,316
The Block 1 rocket will
be able to deliver more

60

00:03:35,316 --> 00:03:36,366
than double the payload

61

00:03:36,366 --> 00:03:38,406
of current launch vehicles
to low-earth orbit.

62

00:03:38,836 --> 00:03:40,486
And it's this first rocket

63

00:03:40,486 --> 00:03:43,656
that will deliver an uncrewed
Orion spacecraft around the moon

64

00:03:43,656 --> 00:03:45,496

and back again for
Exploration Mission 1,

65

00:03:45,986 --> 00:03:47,956

which will be the
furthest we've ever tested

66

00:03:48,186 --> 00:03:49,676

human-rated spacecraft.

67

00:03:52,566 --> 00:03:56,566

Rockets are typically staged to
reduce weight as they burn fuel,

68

00:03:56,566 --> 00:03:58,206

and the SLS is no different.

69

00:03:59,226 --> 00:04:01,546

The core stage is the
main body of the rocket

70

00:04:01,546 --> 00:04:03,746

and houses the fuel for
its four main engines

71

00:04:03,746 --> 00:04:05,236

and the avionics for the rocket.

72

00:04:06,426 --> 00:04:09,616

The core stage will be the
tallest rocket stage ever built.

73

00:04:11,736 --> 00:04:15,146

The Interim Cryogenic Propulsion
Stage is the upper stage

74

00:04:15,146 --> 00:04:18,096

for the Block 1 rocket, and
it will provide the thrust

75

00:04:18,096 --> 00:04:20,236

to lift Orion out
of low-earth orbit

76

00:04:20,556 --> 00:04:23,376

onto its historic first
journey to the moon.

77

00:04:25,176 --> 00:04:27,816

The solid rocket boosters
are heritage technology

78

00:04:27,816 --> 00:04:30,246

from the Space Shuttle era
with a little extra kick.

79

00:04:31,156 --> 00:04:33,796

These boosters are each
taller in size than the Statue

80

00:04:33,796 --> 00:04:36,016

of Liberty, and they
will provide the majority

81

00:04:36,016 --> 00:04:37,616

of the thrust for the
rocket at liftoff.

82

00:04:38,586 --> 00:04:41,206

Two full-scale tests of these
boosters have already occurred,

83

00:04:41,376 --> 00:04:42,896

paving the way for
the first flight.

84

00:04:46,696 --> 00:04:48,586

For the first crewed mission

85

00:04:48,586 --> 00:04:51,446
of the Orion spacecraft
NASA will upgrade the rocket

86
00:04:51,446 --> 00:04:53,286
to what is referred
to as Block 1B.

87
00:04:53,676 --> 00:04:56,616
The primary difference
between the Block 1

88
00:04:56,616 --> 00:04:58,556
and Block 1B vehicles
is the addition

89
00:04:58,556 --> 00:05:00,216
of the exploration upper stage.

90
00:05:01,146 --> 00:05:04,076
With this enhanced upper
stage, the SLS will be able

91
00:05:04,076 --> 00:05:05,836
to deliver more than
triple the payload

92
00:05:05,836 --> 00:05:07,876
of current launch vehicles
to low-earth orbit.

93
00:05:08,896 --> 00:05:11,496
And it's with this enhanced
upper stage that we will be able

94
00:05:11,496 --> 00:05:13,996
to carry not just people
on the Orion spacecraft,

95
00:05:14,656 --> 00:05:16,956

but NASA's also planning
a series of payloads

96

00:05:16,956 --> 00:05:19,306

that we will deliver to
the area around the moon.

97

00:05:20,086 --> 00:05:22,516

These payloads make up what
we're calling the Deep Space

98

00:05:22,516 --> 00:05:25,696

Gateway, a kind of mini
space station around the moon

99

00:05:25,696 --> 00:05:27,886

that will be our jumping
off point to go to Mars.

100

00:05:31,636 --> 00:05:34,686

The NASA Glenn Research Center
is playing a critical role

101

00:05:34,686 --> 00:05:35,726

in all this.

102

00:05:36,626 --> 00:05:39,776

We are tasked with managing
and developing the structures

103

00:05:39,776 --> 00:05:42,276

at the top of the rocket,
whether it's carrying crew

104

00:05:42,276 --> 00:05:45,206

or cargo off the planet.

105

00:05:45,206 --> 00:05:48,226

Earlier this year we awarded
a contract to Dynetics

106

00:05:48,226 --> 00:05:50,606

with their partners

RUAG, Systima,

107

00:05:50,606 --> 00:05:54,146

and local Cleveland companies

in technologies to develop

108

00:05:54,146 --> 00:05:56,926

and build the Universal

Stage Adapter or the USA.

109

00:05:58,116 --> 00:06:00,926

Its primary function is to

adapt the larger diameter

110

00:06:00,926 --> 00:06:02,246

of the SLS upper stage

111

00:06:02,246 --> 00:06:04,596

to the smaller diameter

Orion spacecraft.

112

00:06:05,376 --> 00:06:06,896

It provides the structure

113

00:06:06,896 --> 00:06:09,806

to safely carry the Orion

from ground to orbit.

114

00:06:10,576 --> 00:06:12,566

In addition to carrying

the Orion,

115

00:06:12,566 --> 00:06:14,986

the USA will also house

the payloads that make

116

00:06:14,986 --> 00:06:16,426
up the Deep Space Gateway.

117

00:06:17,106 --> 00:06:19,806
As you can imagine, a rocket
of this size produces a lot

118

00:06:19,806 --> 00:06:21,696
of heat, noise, and vibration.

119

00:06:21,696 --> 00:06:24,486
And the USA will provide
a reasonable environment

120

00:06:24,486 --> 00:06:26,786
for those payloads to
survive their trip to orbit.

121

00:06:31,606 --> 00:06:33,996
In addition to the
Universal Stage Adapter,

122

00:06:33,996 --> 00:06:36,406
which will be used on
crewed missions of the SLS,

123

00:06:36,656 --> 00:06:38,636
the Glenn Research Center
also leads the development

124

00:06:38,636 --> 00:06:40,056
of payload fairings,
which will be used

125

00:06:40,056 --> 00:06:42,116
on planned cargo
missions of the SLS.

126

00:06:42,946 --> 00:06:45,276
Fairings are used

to house spacecraft

127

00:06:45,276 --> 00:06:48,436

when the crewed Orion
capsule isn't riding on top.

128

00:06:49,156 --> 00:06:51,736

The SLS will allow us
the opportunity to dream

129

00:06:51,736 --> 00:06:54,556

of large space telescopes
and planetary explorers

130

00:06:54,556 --> 00:06:56,656

that wouldn't be possible
on other launch vehicles.

131

00:06:57,596 --> 00:07:01,496

It could also cut the transit
time to distant locations.

132

00:07:02,146 --> 00:07:04,936

It could cut the time to travel
to the Jovian moon Europa

133

00:07:05,276 --> 00:07:07,206

from around seven and a
half years to a little

134

00:07:07,206 --> 00:07:08,336

over two and a half years.

135

00:07:09,046 --> 00:07:12,376

This reduction in time is
important to both the robustness

136

00:07:12,376 --> 00:07:14,776

of the probes that have to
survive the harsh environments

137

00:07:14,776 --> 00:07:17,036
of space and to the researchers

138

00:07:17,036 --> 00:07:18,896
who traditionally
have long wait times

139

00:07:18,896 --> 00:07:20,606
from launching their
science instruments

140

00:07:20,606 --> 00:07:22,286
to actually collecting
science data.

141

00:07:27,126 --> 00:07:29,926
Let me transition a little
bit to talk about how we plan

142

00:07:29,926 --> 00:07:31,896
to use the SLS and Orion

143

00:07:31,896 --> 00:07:35,496
to build the capability
to go to Mars.

144

00:07:35,496 --> 00:07:38,076
Earlier I touched on what we're
calling the Deep Space Gateway.

145

00:07:38,816 --> 00:07:43,056
It will be a structure around
the moon with power, propulsion,

146

00:07:43,056 --> 00:07:45,206
a docking capability,
and a small place

147

00:07:45,206 --> 00:07:46,076
for the crew to live in.

148
00:07:46,826 --> 00:07:49,376
It will allow astronauts
to begin building

149
00:07:49,376 --> 00:07:51,806
and testing the systems
needed for critical missions

150
00:07:51,806 --> 00:07:53,376
to deep space destinations.

151
00:07:54,306 --> 00:07:56,766
In addition to activities
around the moon,

152
00:07:57,026 --> 00:08:00,026
the gateway can also be used
as a jumping off point to go

153
00:08:00,026 --> 00:08:02,286
to other destinations,
like Mars.

154
00:08:03,496 --> 00:08:05,796
The Glenn Research Center
is leading the development

155
00:08:05,796 --> 00:08:08,736
of the first element of the Deep
Space Gateway, which will launch

156
00:08:08,736 --> 00:08:12,136
on Exploration Mission 2 and
begin this exciting new chapter

157
00:08:12,136 --> 00:08:13,536
of deep space exploration.

158

00:08:14,656 --> 00:08:17,766

And all of the gateway elements
will launch underneath either a

159

00:08:17,766 --> 00:08:20,196

USA or a payload fairing lead
out of Glenn out of Glenn.

160

00:08:20,196 --> 00:08:21,446

So it's a very exciting time

161

00:08:21,446 --> 00:08:23,606

for space flight
development at the center.

162

00:08:26,076 --> 00:08:27,506

I'd like to leave you
with what I think is one

163

00:08:27,506 --> 00:08:30,316

of the most important
impact of the SLS and Orion.

164

00:08:30,656 --> 00:08:32,816

This is my son with
Peggy Whitson

165

00:08:32,816 --> 00:08:34,316

at the Neutral Buoyancy
Lab in Houston.

166

00:08:34,806 --> 00:08:39,006

My kids are lucky to be exposed

167

00:08:39,006 --> 00:08:40,736

to the work that
we do every day.

168

00:08:41,626 --> 00:08:45,206

But each one of us here
has the ability to inspire

169

00:08:45,206 --> 00:08:47,186

and educate future generations.

170

00:08:48,086 --> 00:08:50,566

No matter what you do and
for whatever reason you're

171

00:08:50,566 --> 00:08:53,456

in attendance tonight,
we all have the ability

172

00:08:53,456 --> 00:08:56,436

and the responsibility to
inspire the imagination

173

00:08:56,436 --> 00:08:58,496

and creativity of young
people in this country.

174

00:08:59,826 --> 00:09:02,986

Apollo 17, that last
mission to the moon

175

00:09:02,986 --> 00:09:04,516

that I began this
presentation with,

176

00:09:05,046 --> 00:09:06,836

gave us this iconic picture.

177

00:09:08,056 --> 00:09:11,556

It was a picture that showed
everyone how beautiful

178

00:09:11,556 --> 00:09:13,086

and fragile our planet is.

179

00:09:14,216 --> 00:09:18,876

Apollo inspired a generation
of entrepreneurs and inventors.

180

00:09:19,646 --> 00:09:20,956

I grew up in the
Space Shuttle era,

181

00:09:20,956 --> 00:09:22,256

and that's what inspired me.

182

00:09:23,296 --> 00:09:25,456

Much like Apollo,
the Space Shuttle,

183

00:09:25,456 --> 00:09:27,526

and the Space Station
have inspired kids

184

00:09:27,526 --> 00:09:30,596

from around the world to pursue
science and technical careers,

185

00:09:31,016 --> 00:09:34,656

the SLS and Orion have the
opportunity to do the same.

186

00:09:35,816 --> 00:09:37,056

This is a picture of people

187

00:09:37,056 --> 00:09:40,056

in Times Square watching the
landing of the Curiosity rover.

188

00:09:41,176 --> 00:09:45,376

These are the faces of people
inspired by the landing

189

00:09:45,486 --> 00:09:49,746
of a robot on Mars -- a robot.

190
00:09:51,616 --> 00:09:54,476
Imagine what these
faces will look

191
00:09:54,476 --> 00:09:57,966
like when we land
people on Mars.

192
00:09:59,236 --> 00:10:01,786
NASA and the work that
we do is inspiring.

193
00:10:01,786 --> 00:10:04,706
And I hope that our work
will inspire my children