1
00:00:01,030 --> 00:00:05,093
■ Mysterious music...■

2
00:00:05,093 --> 00:00:08,010
Spaceflight is not easy.

3
00:00:08,010 --> 00:00:09,027
There are many obstacles

4
00:00:09,027 --> 00:00:11,080
to overcome.

5
00:00:11,080 --> 00:00:12,090
All systems of a space

6
00:00:12,090 --> 00:00:14,023
vehicle must work together

7
00:00:14,023 --> 00:00:15,070
perfectly...in an

8
00:00:15,070 --> 00:00:17,080
unforgiving environment

9
00:00:17,080 --> 00:00:18,043
that doesn't allow for

10
00:00:18,043 --> 00:00:20,010
errors.

11
00:00:20,010 --> 00:00:21,013
A spacecraft must travel

12
00:00:21,013 --> 00:00:22,067
over 30 times the speed of

13
00:00:22,067 --> 00:00:24,027

sound to escape Earth's

14
00:00:24,027 --> 00:00:26,033
gravity...

15
00:00:26,033 --> 00:00:27,000
It must endure extreme

16
00:00:27,000 --> 00:00:28,077
temperatures...pressures

17
00:00:28,077 --> 00:00:30,053
and vibrations...

18
00:00:30,053 --> 00:00:31,090
For a ship that carries a

19
00:00:31,090 --> 00:00:33,053
crew, it must get human

20
00:00:33,053 --> 00:00:34,057
beings into space and

21
00:00:34,057 --> 00:00:40,083
return them...safely.

22
00:00:40,083 --> 00:00:44,020
■ ■

23
00:00:44,020 --> 00:00:45,000
Confronted with these

24
00:00:45,000 --> 00:00:45,093
challenges over the years,

25
00:00:45,093 --> 00:00:47,077
NASA engineers developed a

26
00:00:47,077 --> 00:00:48,083
system to build

27
00:00:48,083 --> 00:00:50,050
spacecraft...designing and

28
00:00:50,050 --> 00:00:52,093
testing bit by bit...then

29
00:00:52,093 --> 00:00:54,007
bringing all the elements

30
00:00:54,007 --> 00:00:55,007
together in a series of

31
00:00:55,007 --> 00:00:56,097
flight tests .

32
00:00:56,097 --> 00:00:57,053
It has been said that one

33
00:00:57,053 --> 00:00:59,020
good flight test is worth

34
00:00:59,020 --> 00:01:00,023
a thousand expert

35
00:01:00,023 --> 00:01:01,073
opinions.

36
00:01:01,073 --> 00:01:02,083
The flight tests either

37
00:01:02,083 --> 00:01:03,073
confirm engineers'

38
00:01:03,073 --> 00:01:04,093

predictions...or direct

39
00:01:04,093 --> 00:01:06,010
their attention to what

40
00:01:06,010 --> 00:01:08,050
needs to be fixed.

41
00:01:08,050 --> 00:01:09,053
NASA's new space program

42
00:01:09,053 --> 00:01:12,060
is called Constellation.

43
00:01:12,060 --> 00:01:13,060
A new generation of space

44
00:01:13,060 --> 00:01:15,010
vehicles will take crews

45
00:01:15,010 --> 00:01:16,073
to the International Space

46
00:01:16,073 --> 00:01:18,030
Station, return humans to

47
00:01:18,030 --> 00:01:20,027
the Moon and even expand

48
00:01:20,027 --> 00:01:22,023
humankind's reach farther

49
00:01:22,023 --> 00:01:24,073
out into the solar system.

50
00:01:24,073 --> 00:01:25,080
For the Constellation era,

51
00:01:25,080 --> 00:01:27,057
spacecraft designs and

52
00:01:27,057 --> 00:01:29,030
hardware have reached the

53
00:01:29,030 --> 00:01:30,023
point where the first

54
00:01:30,023 --> 00:01:31,053
flight tests...

55
00:01:31,053 --> 00:01:35,020
begin...now....

56
00:01:57,087 --> 00:01:45,077
■ ■

57
00:01:57,087 --> 00:01:58,077
Creating a spacecraft is a

58
00:01:58,077 --> 00:02:00,007
process.

59
00:02:00,007 --> 00:02:02,027
Engineers conceptualize,

60
00:02:02,027 --> 00:02:03,047
model and predict the

61
00:02:03,047 --> 00:02:04,087
performance of a vehicle

62
00:02:04,087 --> 00:02:06,020
using computers and other

63
00:02:06,020 --> 00:02:07,080

development tools.

64
00:02:07,080 --> 00:02:09,070
Eventually, the design is

65
00:02:09,070 --> 00:02:10,093
put to the test in the

66
00:02:10,093 --> 00:02:12,043
real world...but not all

67
00:02:12,043 --> 00:02:13,087
at once.

68
00:02:13,087 --> 00:02:15,027
Rather than launch an

69
00:02:15,027 --> 00:02:16,057
entire vehicle, components

70
00:02:16,057 --> 00:02:18,027
are tested one piece at a

71
00:02:18,027 --> 00:02:19,093
time before being brought

72
00:02:19,093 --> 00:02:21,020
together in an integrated

73
00:02:21,020 --> 00:02:22,050
flight test.

74
00:02:22,050 --> 00:02:23,070
It's a tried and true

75
00:02:23,070 --> 00:02:25,037
method called "test as you

76
00:02:25,037 --> 00:02:27,067
go".

77
00:02:27,067 --> 00:02:28,063
Geyer- "...it's so

78
00:02:28,063 --> 00:02:29,060
important to, as you're

79
00:02:29,060 --> 00:02:30,070
doing your design, to do

80
00:02:30,070 --> 00:02:33,043
early checks to validate

81
00:02:33,043 --> 00:02:35,000
your fundamental

82
00:02:35,000 --> 00:02:35,093
assumptions.

83
00:02:35,093 --> 00:02:37,013
It's cheaper to test these

84
00:02:37,013 --> 00:02:38,003
individual things by

85
00:02:38,003 --> 00:02:39,017
themselves before they're

86
00:02:39,017 --> 00:02:40,020
part of an integrated

87
00:02:40,020 --> 00:02:40,077
system.

88
00:02:40,077 --> 00:02:41,047

So, in an integrated

89
00:02:41,047 --> 00:02:42,023
system if it failed during

90
00:02:42,023 --> 00:02:42,097
flight, it would be much

91
00:02:42,097 --> 00:02:43,093
more expensive.

92
00:02:43,093 --> 00:02:44,080
So you want to break it

93
00:02:44,080 --> 00:02:46,053
down in pieces."

94
00:02:46,053 --> 00:02:47,010
NARRATOR: Engineers would

95
00:02:47,010 --> 00:02:48,003
rather discover a design

96
00:02:48,003 --> 00:02:49,033
flaw on a test

97
00:02:49,033 --> 00:02:51,010
stand...instead of during

98
00:02:51,010 --> 00:02:52,013
a flight.

99
00:02:52,013 --> 00:02:53,067
(motor blowup sound effect)

100
00:02:53,067 --> 00:02:54,057
The end goal of

101
00:02:54,057 --> 00:02:55,073
using the method is to

102
00:02:55,073 --> 00:02:57,087
build a safer vehicle...

103
00:02:57,087 --> 00:02:58,070
Vanessa Wyche:"Certainly

104
00:02:58,070 --> 00:03:00,077
before the crew is

105
00:03:00,077 --> 00:03:02,063
launched for the first

106
00:03:02,063 --> 00:03:03,093
time the intent would be

107
00:03:03,093 --> 00:03:05,070
to do a really good

108
00:03:05,070 --> 00:03:06,087
thorough ringing out of

109
00:03:06,087 --> 00:03:08,000
all of the systems to

110
00:03:08,000 --> 00:03:10,010
understand that we've

111
00:03:10,010 --> 00:03:11,040
closed our, or brought

112
00:03:11,040 --> 00:03:12,033
down any of the risks that

113
00:03:12,033 --> 00:03:15,040

are involved with, with

114
00:03:15,040 --> 00:03:16,053
the flight of the vehicle

115
00:03:16,053 --> 00:03:17,047
prior to putting humans

116
00:03:17,047 --> 00:03:18,037
on.

117
00:03:18,037 --> 00:03:18,073
NARRATOR: The Space

118
00:03:18,073 --> 00:03:19,077
Shuttle was the only

119
00:03:19,077 --> 00:03:21,050
spacecraft launched as a

120
00:03:21,050 --> 00:03:22,063
complete system without

121
00:03:22,063 --> 00:03:25,033
flying an unmanned test

122
00:03:25,033 --> 00:03:26,023
first.

123
00:03:26,023 --> 00:03:27,033
The integrated flight

124
00:03:27,033 --> 00:03:28,077
included detaching solid

125
00:03:28,077 --> 00:03:30,043
rocket boosters, a

126
00:03:30,043 --> 00:03:32,010
detaching external tank, a

127
00:03:32,010 --> 00:03:33,043
return through the Earth's

128
00:03:33,043 --> 00:03:35,057
atmosphere and unpowered

129
00:03:35,057 --> 00:03:37,043
landing from orbit...all

130
00:03:37,043 --> 00:03:38,097
of which were tested for

131
00:03:38,097 --> 00:03:40,023
the first time with a crew

132
00:03:40,023 --> 00:03:42,037
onboard.

133
00:03:42,037 --> 00:03:43,067
For Constellation, the

134
00:03:43,067 --> 00:03:44,070
spacecraft will see a

135
00:03:44,070 --> 00:03:46,073
return to unmanned flight

136
00:03:46,073 --> 00:03:48,070
tests.

137
00:03:52,040 --> 00:03:59,077
■ ■

138
00:03:59,077 --> 00:04:00,053

NARRATOR: The

139
00:04:00,053 --> 00:04:01,033
Constellation launch

140
00:04:01,033 --> 00:04:02,030
vehicle that will carry

141
00:04:02,030 --> 00:04:03,023
the crew into space is

142
00:04:03,023 --> 00:04:05,057
called Ares I.

143
00:04:05,057 --> 00:04:06,090
Ares I consists of a

144
00:04:06,090 --> 00:04:08,033
Shuttle-derived solid

145
00:04:08,033 --> 00:04:09,043
rocket booster for a lower

146
00:04:09,043 --> 00:04:11,000
stage and a liquid fuel

147
00:04:11,000 --> 00:04:15,053
rocket for an upper stage.

148
00:04:15,053 --> 00:04:17,007
Sitting on top of Ares I

149
00:04:17,007 --> 00:04:18,023
is the Orion Crew

150
00:04:18,023 --> 00:04:19,080
Exploration Vehicle.

151
00:04:19,080 --> 00:04:21,010
Orion is similar in shape

152
00:04:21,010 --> 00:04:22,077
to the Apollo spacecraft

153
00:04:22,077 --> 00:04:24,020
but is larger and features

154
00:04:24,020 --> 00:04:25,037
state of the art

155
00:04:25,037 --> 00:04:26,087
equipment.

156
00:04:26,087 --> 00:04:27,090
Orion can dock with the

157
00:04:27,090 --> 00:04:29,037
space station...rendezvous

158
00:04:29,037 --> 00:04:30,050
with other components for

159
00:04:30,050 --> 00:04:32,013
a lunar mission...and even

160
00:04:32,013 --> 00:04:33,033
be modified to play a part

161
00:04:33,033 --> 00:04:35,047
in a mission to Mars.

162
00:04:35,047 --> 00:04:37,010
All of these potential

163
00:04:37,010 --> 00:04:38,077

journeys depend upon the

164
00:04:38,077 --> 00:04:40,027
Ares I launch vehicle

165
00:04:40,027 --> 00:04:44,003
getting Orion into orbit.

166
00:04:44,003 --> 00:04:45,027
Like past NASA spacecraft,

167
00:04:45,027 --> 00:04:46,090
engineers are applying the

168
00:04:46,090 --> 00:04:48,020
"test as you go" method to

169
00:04:48,020 --> 00:04:50,017
Ares I.

170
00:04:50,017 --> 00:04:51,033
Computer analysis and

171
00:04:51,033 --> 00:04:52,040
early development tests

172
00:04:52,040 --> 00:04:55,057
begin the process.

173
00:04:55,057 --> 00:04:56,037
On the hardware side,

174
00:04:56,037 --> 00:04:57,067
parts of the rocket have

175
00:04:57,067 --> 00:04:58,053
been tried out

176
00:04:58,053 --> 00:04:59,050
individually.

177
00:04:59,050 --> 00:05:00,077
In the test as you go

178
00:05:00,077 --> 00:05:02,073
world, it is time to fly,

179
00:05:02,073 --> 00:05:04,050
and the first flight test

180
00:05:04,050 --> 00:05:06,050
for Ares I is a vehicle

181
00:05:06,050 --> 00:05:09,003
called Ares 1-X.

182
00:05:09,003 --> 00:05:09,073
It is an unmanned test and

183
00:05:09,073 --> 00:05:11,040
will focus on the first

184
00:05:11,040 --> 00:05:13,077
stage of flight.

185
00:05:13,077 --> 00:05:14,080
Bob Ess-: "Ares I-X is the

186
00:05:14,080 --> 00:05:16,070
same length as Ares I, the

187
00:05:16,070 --> 00:05:17,087
same diameter, it has a

188
00:05:17,087 --> 00:05:19,017

similar rocket on the

189
00:05:19,017 --> 00:05:21,023
bottom end, and its goal

190
00:05:21,023 --> 00:05:22,073
is to simulate the flight

191
00:05:22,073 --> 00:05:23,093
and test out the flight

192
00:05:23,093 --> 00:05:25,007
control to make sure the

193
00:05:25,007 --> 00:05:26,067
engineers have enough data

194
00:05:26,067 --> 00:05:27,090
in order to finish

195
00:05:27,090 --> 00:05:29,023
designing and building the

196
00:05:29,023 --> 00:05:31,023
Ares I ."

197
00:05:31,023 --> 00:05:32,013
Components for the Ares

198
00:05:32,013 --> 00:05:33,070
1-X have come from around

199
00:05:33,070 --> 00:05:35,007
the country.

200
00:05:35,007 --> 00:05:38,023
The rocket is being

201
00:05:38,023 --> 00:05:39,027
assembled at the Kennedy

202
00:05:39,027 --> 00:05:40,023
Space Center in

203
00:05:40,023 --> 00:05:42,003
Florida...the first new

204
00:05:42,003 --> 00:05:43,023
space vehicle in almost

205
00:05:43,023 --> 00:05:45,060
three decades.

206
00:05:45,060 --> 00:05:46,077
Ares 1-X features a four

207
00:05:46,077 --> 00:05:48,020
segment solid rocket

208
00:05:48,020 --> 00:05:49,043
booster which will lift

209
00:05:49,043 --> 00:05:50,047
the vehicle during its two

210
00:05:50,047 --> 00:05:52,077
minutes of powered flight.

211
00:05:52,077 --> 00:05:54,047
The real Ares I rocket

212
00:05:54,047 --> 00:05:55,033
will actually have a fifth

213
00:05:55,033 --> 00:05:56,060

segment to help push it

214
00:05:56,060 --> 00:05:58,017
into space.

215
00:05:58,017 --> 00:05:59,003
For this early test

216
00:05:59,003 --> 00:06:00,050
however, the fifth segment

217
00:06:00,050 --> 00:06:02,003
is an inactive mockup, as

218
00:06:02,003 --> 00:06:03,023
is the rest of the upper

219
00:06:03,023 --> 00:06:05,033
stage, crew module and

220
00:06:05,033 --> 00:06:07,073
launch abort system.

221
00:06:07,073 --> 00:06:09,040
The Ares 1-X test will

222
00:06:09,040 --> 00:06:10,073
climb 25 miles in

223
00:06:10,073 --> 00:06:13,097
altitude.

224
00:06:13,097 --> 00:06:14,090
The first and second stage

225
00:06:14,090 --> 00:06:16,007
will separate.

226
00:06:16,007 --> 00:06:17,033
The test continues as the

227
00:06:17,033 --> 00:06:18,087
parachute system is

228
00:06:18,087 --> 00:06:20,000
deployed for the solid

229
00:06:20,000 --> 00:06:21,037
rocket booster, which will

230
00:06:21,037 --> 00:06:23,080
gently descend to the sea.

231
00:06:23,080 --> 00:06:24,070
From flight dynamics, to

232
00:06:24,070 --> 00:06:25,097
control, to stage

233
00:06:25,097 --> 00:06:27,040
recovery, the data

234
00:06:27,040 --> 00:06:28,080
gathered as a result of

235
00:06:28,080 --> 00:06:30,003
this flight will give

236
00:06:30,003 --> 00:06:31,007
engineers the early look

237
00:06:31,007 --> 00:06:32,067
they need to see how the

238
00:06:32,067 --> 00:06:34,087

design is progressing...

239
00:06:34,087 --> 00:06:35,040
Jon Cowart: "We have

240
00:06:35,040 --> 00:06:36,007
somewhere in the

241
00:06:36,007 --> 00:06:37,010
neighborhood of 700

242
00:06:37,010 --> 00:06:38,053
special sensors on this

243
00:06:38,053 --> 00:06:39,073
rocket that we'll use to

244
00:06:39,073 --> 00:06:41,047
collect data on the rocket

245
00:06:41,047 --> 00:06:42,040
as it launches, and

246
00:06:42,040 --> 00:06:43,063
ascends, and separates and

247
00:06:43,063 --> 00:06:44,077
comes back down.

248
00:06:44,077 --> 00:06:45,050
The sensors are looking

249
00:06:45,050 --> 00:06:46,063
at pressures and

250
00:06:46,063 --> 00:06:47,083
temperatures, stresses and

251
00:06:47,083 --> 00:06:49,007
strains and

252
00:06:49,007 --> 00:06:49,087
vibrations...and all kinds

253
00:06:49,087 --> 00:06:50,083
of things.

254
00:06:50,083 --> 00:06:52,013
These are the clues that

255
00:06:52,013 --> 00:06:53,057
we have to what's

256
00:06:53,057 --> 00:06:54,077
happening at various

257
00:06:54,077 --> 00:06:55,087
locations along the

258
00:06:55,087 --> 00:06:56,043
rocket.

259
00:06:56,043 --> 00:06:57,060
This mission is all about,

260
00:06:57,060 --> 00:06:58,080
besides being cheap and

261
00:06:58,080 --> 00:07:00,023
quick, we're all about

262
00:07:00,023 --> 00:07:00,090
gathering data for the

263
00:07:00,090 --> 00:07:02,023

Ares 1 folks for their

264
00:07:02,023 --> 00:07:03,007
critical design review so

265
00:07:03,007 --> 00:07:04,010
they can use it.

266
00:07:04,010 --> 00:07:05,037
Once we have that data,

267
00:07:05,037 --> 00:07:06,087
the Ares folks have other

268
00:07:06,087 --> 00:07:07,090
tests that they plan to

269
00:07:07,090 --> 00:07:09,020
take them higher into the

270
00:07:09,020 --> 00:07:10,007
atmosphere and collect

271
00:07:10,007 --> 00:07:11,053
more data down that way."

272
00:07:11,053 --> 00:07:12,010
Bob Ess- "When we actually

273
00:07:12,010 --> 00:07:13,020
fly, we expect to have

274
00:07:13,020 --> 00:07:14,020
things that don't go

275
00:07:14,020 --> 00:07:15,017
perfectly...in fact we

276
00:07:15,017 --> 00:07:16,013
hope they do.

277
00:07:16,013 --> 00:07:16,090
You learn a lot when

278
00:07:16,090 --> 00:07:17,090
everything goes right; you

279
00:07:17,090 --> 00:07:19,050
learn a tremendous amount

280
00:07:19,050 --> 00:07:20,023
when something doesn't go

281
00:07:20,023 --> 00:07:21,013
quite as right, because

282
00:07:21,013 --> 00:07:22,000
then you have something to

283
00:07:22,000 --> 00:07:22,060
go fix, to go look at, go

284
00:07:22,060 --> 00:07:24,063
analyze and then retest on

285
00:07:24,063 --> 00:07:26,093
a subsequent flight."

286
00:07:28,053 --> 00:07:40,003
■Music: 60's Surf music. ■

287
00:07:40,003 --> 00:07:40,047
Narrator: It's the mid

288
00:07:40,047 --> 00:07:42,023

1960's, and the Apollo

289
00:07:42,023 --> 00:07:43,037
Program is testing its

290
00:07:43,037 --> 00:07:44,080
Launch Escape System.

291
00:07:44,080 --> 00:07:46,063
At the White Sands Missile

292
00:07:46,063 --> 00:07:47,073
Range in Las Cruces New

293
00:07:47,073 --> 00:07:49,063
Mexico, a squatty rocket

294
00:07:49,063 --> 00:07:51,057
nicknamed Little Joe 2

295
00:07:51,057 --> 00:07:52,097
launches an Apollo capsule

296
00:07:52,097 --> 00:07:55,023
for a high altitude test.

297
00:07:55,023 --> 00:07:57,037
Engineers want to see if

298
00:07:57,037 --> 00:07:58,073
the escape system can pull

299
00:07:58,073 --> 00:07:59,083
the capsule away from

300
00:07:59,083 --> 00:08:01,043
danger in the event of an

301
00:08:01,043 --> 00:08:02,030
emergency.

302
00:08:02,030 --> 00:08:04,027
The unmanned test shows

303
00:08:04,027 --> 00:08:06,043
the escape system works!

304
00:08:06,043 --> 00:08:09,067
■ ■

305
00:08:09,067 --> 00:08:10,063
Years later, an escape

306
00:08:10,063 --> 00:08:12,010
system was used for real

307
00:08:12,010 --> 00:08:14,030
on a Russian Soyuz rocket.

308
00:08:14,030 --> 00:08:15,073
When spilt fuel caught

309
00:08:15,073 --> 00:08:16,097
fire on the launch pad, an

310
00:08:16,097 --> 00:08:18,047
escape rocket pulled the

311
00:08:18,047 --> 00:08:20,007
crew away from the hazard,

312
00:08:20,007 --> 00:08:23,003
saving their lives.

313
00:08:23,003 --> 00:08:24,073

For Orion, crew safety is

314
00:08:24,073 --> 00:08:26,040
a prime factor in its

315
00:08:26,040 --> 00:08:28,003
design.

316
00:08:28,003 --> 00:08:29,000
Engineers have included a

317
00:08:29,000 --> 00:08:30,027
Launch Abort System which

318
00:08:30,027 --> 00:08:31,047
is more robust and

319
00:08:31,047 --> 00:08:33,010
features more control

320
00:08:33,010 --> 00:08:34,080
capability than any of its

321
00:08:34,080 --> 00:08:38,033
predecessors.

322
00:08:38,033 --> 00:08:39,033
Once again, the White

323
00:08:39,033 --> 00:08:40,073
Sands Missile Range will

324
00:08:40,073 --> 00:08:42,010
play host to the escape

325
00:08:42,010 --> 00:08:44,053
system flight tests.

326
00:08:44,053 --> 00:08:45,093
A mock crew module will

327
00:08:45,093 --> 00:08:46,080
sit in for the Orion

328
00:08:46,080 --> 00:08:48,007
spacecraft.

329
00:08:48,007 --> 00:08:49,027
Instead of a crew, a

330
00:08:49,027 --> 00:08:50,070
battery of sensors are

331
00:08:50,070 --> 00:08:52,030
installed inside to help

332
00:08:52,030 --> 00:08:54,043
analyze the flight.

333
00:08:54,043 --> 00:08:56,057
Called Pad Abort-1, the

334
00:08:56,057 --> 00:08:57,057
test will simulate an

335
00:08:57,057 --> 00:08:59,013
abort off the Ares I,

336
00:08:59,013 --> 00:09:01,003
while it is still sitting

337
00:09:01,003 --> 00:09:01,093
on the launch pad.

338
00:09:01,093 --> 00:09:03,027

Because an abort must

339
00:09:03,027 --> 00:09:04,090
happen quickly, the entire

340
00:09:04,090 --> 00:09:06,063
test will take place in a

341
00:09:06,063 --> 00:09:08,087
matter of seconds...

342
00:09:08,087 --> 00:09:09,073
Don Reed:"So the first

343
00:09:09,073 --> 00:09:10,080
thing that happens is we

344
00:09:10,080 --> 00:09:12,070
fire, send a command to

345
00:09:12,070 --> 00:09:13,087
fire the abort motor and,

346
00:09:13,087 --> 00:09:15,047
at the same time, we fire

347
00:09:15,047 --> 00:09:16,073
the command, send the

348
00:09:16,073 --> 00:09:17,060
command to fire the

349
00:09:17,060 --> 00:09:18,060
attitude control motor.

350
00:09:18,060 --> 00:09:20,040
So right off the bat we,

351
00:09:20,040 --> 00:09:22,000
we put out five hundred

352
00:09:22,000 --> 00:09:23,007
thousand pounds of thrust

353
00:09:23,007 --> 00:09:24,043
and in the first two

354
00:09:24,043 --> 00:09:25,033
seconds we accelerate to

355
00:09:25,033 --> 00:09:27,077
about Mach point six..."

356
00:09:27,077 --> 00:09:29,047
Reed (continued) "...about

357
00:09:29,047 --> 00:09:30,070
ten seconds we send the

358
00:09:30,070 --> 00:09:32,043
command to reorient...

359
00:09:32,043 --> 00:09:33,080
what'll happen then is

360
00:09:33,080 --> 00:09:36,003
that the attitude control

361
00:09:36,003 --> 00:09:37,000
motor will then start to

362
00:09:37,000 --> 00:09:37,080
pitch the vehicle over and

363
00:09:37,080 --> 00:09:39,010

reorient it ...we're now

364
00:09:39,010 --> 00:09:40,010
flying that the heat

365
00:09:40,010 --> 00:09:41,057
shield is now forward into

366
00:09:41,057 --> 00:09:43,007
the air stream."

367
00:09:43,007 --> 00:09:43,087
Reed: (continued) "At

368
00:09:43,087 --> 00:09:44,073
twenty-one seconds we'll

369
00:09:44,073 --> 00:09:46,007
go ahead and fire the

370
00:09:46,007 --> 00:09:47,053
jettison motor which then

371
00:09:47,053 --> 00:09:48,080
jettisons this whole tower

372
00:09:48,080 --> 00:09:50,000
so now you just have the,

373
00:09:50,000 --> 00:09:51,050
the crew module flying by

374
00:09:51,050 --> 00:09:53,047
itself.

375
00:09:53,047 --> 00:09:54,050
Twenty-three seconds,

376
00:09:54,050 --> 00:09:55,040
we'll then jettison the

377
00:09:55,040 --> 00:09:56,033
forward bay cover and then

378
00:09:56,033 --> 00:09:58,007
two seconds later, at

379
00:09:58,007 --> 00:09:59,033
twenty-five seconds, we'll

380
00:09:59,033 --> 00:10:00,067
deploy the drogue chutes.

381
00:10:00,067 --> 00:10:02,007
And then for the next

382
00:10:02,007 --> 00:10:03,040
fifty seconds we're

383
00:10:03,040 --> 00:10:04,083
basically descending in

384
00:10:04,083 --> 00:10:06,050
stable flight, under the

385
00:10:06,050 --> 00:10:07,047
three main parachutes."

386
00:10:07,047 --> 00:10:08,057
Reed: "And so by testing

387
00:10:08,057 --> 00:10:10,027
this abort system, we

388
00:10:10,027 --> 00:10:11,027

directly influence the

389
00:10:11,027 --> 00:10:14,010
ability to keep the crew

390
00:10:14,010 --> 00:10:16,083
safe.

391
00:10:16,083 --> 00:10:17,033
It's what I've done my

392
00:10:17,033 --> 00:10:18,047
whole career is doing

393
00:10:18,047 --> 00:10:19,037
flight tests, so to

394
00:10:19,037 --> 00:10:20,070
actually be here and be

395
00:10:20,070 --> 00:10:21,047
part of this program and

396
00:10:21,047 --> 00:10:23,047
doing flight tests...I

397
00:10:23,047 --> 00:10:24,050
couldn't think of a better

398
00:10:24,050 --> 00:10:26,020
place to be."

399
00:10:31,063 --> 00:10:32,007
NARRATOR: For

400
00:10:32,007 --> 00:10:33,047
Constellation, the flight

401
00:10:33,047 --> 00:10:34,023
tests will continue.

402
00:10:34,023 --> 00:10:36,027
NASA engineers will learn

403
00:10:36,027 --> 00:10:37,087
from every test, make

404
00:10:37,087 --> 00:10:40,003
adjustments, fly more and

405
00:10:40,003 --> 00:10:41,097
push the vehicles harder

406
00:10:41,097 --> 00:10:43,090
and harder.

407
00:10:43,090 --> 00:10:44,090
Their skill, talent and

408
00:10:44,090 --> 00:10:46,067
persistence will shape the

409
00:10:46,067 --> 00:10:48,070
best designs possible for

410
00:10:48,070 --> 00:10:51,010
our vehicles of exploration.

411
00:10:51,010 --> 00:10:52,020
It's work that will affect

412
00:10:52,020 --> 00:10:54,017
future explorers as well.

413
00:10:54,017 --> 00:10:55,040

Constellation's

414
00:10:55,040 --> 00:10:58,003
exploration goals reach

415
00:10:58,003 --> 00:10:59,050
across generations...

416
00:10:59,050 --> 00:11:01,010
inspiring the engineers and

417
00:11:01,010 --> 00:11:03,040
astronauts of tomorrow.

418
00:11:03,040 --> 00:11:04,070
Launching those dreams of

419
00:11:04,070 --> 00:11:07,013
exploring off our planet

420
00:11:07,013 --> 00:11:08,050
might be the biggest

421
00:11:08,050 --> 00:11:11,080
reward of all...

422
00:11:11,080 --> 00:11:12,043
Geyer: "One of the cool

423
00:11:12,043 --> 00:11:13,017
things about Constellation

424
00:11:13,017 --> 00:11:15,047
is it's the beginning of a

425
00:11:15,047 --> 00:11:17,083
long road of opportunities

426
00:11:17,083 --> 00:11:19,010
that has a lot of

427
00:11:19,010 --> 00:11:20,020
capability to have a lot

428
00:11:20,020 --> 00:11:22,070
of exciting missions and

429
00:11:22,070 --> 00:11:23,070
challenges for engineers

430
00:11:23,070 --> 00:11:24,087
and scientists

431
00:11:24,087 --> 00:11:25,053
and astronauts in the

432
00:11:25,053 --> 00:11:26,040
future."

433
00:11:26,040 --> 00:11:26,097
Cowart: "I'm extremely

434
00:11:26,097 --> 00:11:28,083
excited with the

435
00:11:28,083 --> 00:11:30,060
thought of a: going back to

436
00:11:30,060 --> 00:11:33,013
the Moon and b: being there

437
00:11:33,013 --> 00:11:35,020
when we finally land on

438
00:11:35,020 --> 00:11:35,083

Mars.

439
00:11:35,083 --> 00:11:36,080
I'll be able to tell my

440
00:11:36,080 --> 00:11:38,033
kids and my grandkids...

441
00:11:38,033 --> 00:11:39,083
Hey, look!

442
00:11:39,083 --> 00:11:40,053
When we started to go do

443
00:11:40,053 --> 00:11:41,073
this, I worked on that

444
00:11:41,073 --> 00:11:42,060
very first rocket.

445
00:11:42,060 --> 00:11:43,097
All this happened because

446
00:11:43,097 --> 00:11:45,043
we helped do that...we

447
00:11:45,043 --> 00:11:46,037
helped get folks the

448
00:11:46,037 --> 00:11:47,010
data...

449
00:11:47,010 --> 00:11:47,080
It's incremental...we've

450
00:11:47,080 --> 00:11:49,043
built upon everything and

451
00:11:49,043 --> 00:11:50,097
that is just an incredible

452
00:11:50,097 --> 00:11:51,097
feeling to be in on the