

A silhouette of a fighter jet is shown in flight against a clear blue sky. A bright, diagonal streak of orange and yellow light, possibly representing a sun flare or a high-speed maneuver, cuts across the left side of the frame. The jet is positioned in the center-right of the image, facing left.

SPACE SHUTTLE

1
00:00:10,709 --> 00:00:08,629
an idea born in unsettled times

2
00:00:12,950 --> 00:00:10,719
we are going forward

3
00:00:15,589 --> 00:00:12,960
america the united states

4
00:00:20,550 --> 00:00:15,599
is first in space

5
00:00:26,310 --> 00:00:24,470
the most complex machine ever built

6
00:00:29,269 --> 00:00:26,320
to bring humans to

7
00:00:34,389 --> 00:00:31,990
of space and eventually construct the

8
00:00:41,750 --> 00:00:34,399
next stop on the road to space

9
00:00:46,310 --> 00:00:44,150
as 30 years of flight draw to a close

10
00:00:51,910 --> 00:00:46,320
its legacy is one of unsurpassed

11
00:00:56,790 --> 00:00:54,790
nasa space shuttle

12
00:00:59,750 --> 00:00:56,800
space shuttle endeavour is rolling out

13
00:01:04,789 --> 00:00:59,760

to launch pad 39a at nasa's kennedy

14

00:01:08,630 --> 00:01:06,630

in 24 missions

15

00:01:10,950 --> 00:01:08,640

flown over 20 years

16

00:01:14,390 --> 00:01:10,960

endeavour has logged more than 103

17

00:01:16,230 --> 00:01:14,400

million miles in space

18

00:01:18,789 --> 00:01:16,240

the last of nasa's shuttles to be built

19

00:01:21,990 --> 00:01:18,799

endeavour prepares for her final flight

20

00:01:26,710 --> 00:01:24,469

endeavour's six astronauts have trained

21

00:01:28,230 --> 00:01:26,720

for this mission for years well before

22

00:01:30,390 --> 00:01:28,240

any shuttle reaches the launch pad

23

00:01:31,670 --> 00:01:30,400

however a staggering amount of work is

24

00:01:34,469 --> 00:01:31,680

required

25

00:01:35,910 --> 00:01:34,479

the parts plans and people necessary to

26

00:01:38,149 --> 00:01:35,920

make each launch

27

00:01:39,590 --> 00:01:38,159

span the entire nation you've got all

28

00:01:41,590 --> 00:01:39,600

these people all these folks that are in

29

00:01:44,310 --> 00:01:41,600

their 20s some of them in their 30s and

30

00:01:46,149 --> 00:01:44,320

they are no kidding in charge of some

31

00:01:48,950 --> 00:01:46,159

part of the space shuttle some part of

32

00:01:51,350 --> 00:01:48,960

the space station or some part of the

33

00:01:53,190 --> 00:01:51,360

plan and every one of those people

34

00:01:55,109 --> 00:01:53,200

absolutely believes that they are the

35

00:01:56,950 --> 00:01:55,119

one that makes the difference on getting

36

00:02:03,590 --> 00:01:56,960

those astronauts back down to the ground

37

00:02:07,590 --> 00:02:05,670

at nasa's mission assembly facility in

38

00:02:10,309 --> 00:02:07,600

new orleans production begins on the

39

00:02:13,350 --> 00:02:10,319

shuttle's external fuel tank

40

00:02:14,510 --> 00:02:13,360

the last of 136 produced here since

41

00:02:18,869 --> 00:02:14,520

1973.

42

00:02:20,550 --> 00:02:18,879

[Music]

43

00:02:22,470 --> 00:02:20,560

around the same time

44

00:02:25,670 --> 00:02:22,480

in clearfield utah

45

00:02:27,830 --> 00:02:25,680

technicians and atk launch systems start

46

00:02:33,750 --> 00:02:27,840

work on the shuttle system solid rocket

47

00:02:38,150 --> 00:02:35,990

unlike the orange external tank that is

48

00:02:40,550 --> 00:02:38,160

used only once the boosters detach

49

00:02:42,150 --> 00:02:40,560

themselves and parachute into the

50

00:02:45,350 --> 00:02:42,160

atlantic ocean

51
00:02:51,509 --> 00:02:45,360
they are then retrieved refurbished and

52
00:02:55,270 --> 00:02:53,750
the shuttle missions crew is assigned

53
00:02:57,270 --> 00:02:55,280
right up until launch

54
00:03:00,070 --> 00:02:57,280
a shuttle crew will train in a variety

55
00:03:02,790 --> 00:03:00,080
of critical regimens some basic

56
00:03:05,030 --> 00:03:02,800
others specific to their mission

57
00:03:06,690 --> 00:03:05,040
simulators

58
00:03:07,990 --> 00:03:06,700
safety and contingency

59
00:03:10,470 --> 00:03:08,000
[Music]

60
00:03:12,949 --> 00:03:10,480
science experiments

61
00:03:20,070 --> 00:03:12,959
and underwater in the world's largest

62
00:03:25,190 --> 00:03:23,030
one month later the et is mated to the

63
00:03:28,149 --> 00:03:25,200

solid rocket boosters to form the

64

00:03:29,110 --> 00:03:28,159

backbone of the stack now all that's

65

00:03:32,780 --> 00:03:29,120

missing

66

00:03:35,750 --> 00:03:32,790

is the spacecraft itself

67

00:03:38,470 --> 00:03:35,760

[Music]

68

00:03:40,309 --> 00:03:38,480

looking now much like it will at liftoff

69

00:03:42,789 --> 00:03:40,319

the space shuttle is carried to the

70

00:03:45,990 --> 00:03:42,799

launch pad atop the six million pound

71

00:03:48,149 --> 00:03:46,000

crawler transporter at a blazing pace of

72

00:03:49,509 --> 00:03:48,159

less than a mile an hour

73

00:03:51,750 --> 00:03:49,519

not exactly

74

00:03:53,110 --> 00:03:51,760

warm speed at our peak carrying full

75

00:03:55,429 --> 00:03:53,120

load we get a

76
00:03:57,990 --> 00:03:55,439
right around 38 feet per gallon not too

77
00:04:01,830 --> 00:03:58,000
bad for an original 1965 hybrid vehicle

78
00:04:08,309 --> 00:04:01,840
with low miles the 3.4 mile journey

79
00:04:12,710 --> 00:04:10,390
now on the launch pad the orbiter is

80
00:04:15,429 --> 00:04:12,720
ready to take on its main payload

81
00:04:17,749 --> 00:04:15,439
testing assures that the multi-ton cargo

82
00:04:19,830 --> 00:04:17,759
is secured and safely stowed in the

83
00:04:22,069 --> 00:04:19,840
payload bay before the technician

84
00:04:27,270 --> 00:04:22,079
certified the orbiter is ready for

85
00:04:31,909 --> 00:04:29,430
flying t-38 aircraft from ellington

86
00:04:37,350 --> 00:04:31,919
field in houston the crew members arrive

87
00:04:41,430 --> 00:04:39,030
this is the mtd conducting the launch

88
00:04:44,629 --> 00:04:41,440

status check all stations verify ready

89

00:04:45,590 --> 00:04:44,639

to resume count and go for launch etc

90

00:04:47,909 --> 00:04:45,600

seagal

91

00:04:49,749 --> 00:04:47,919

pvc tbc

92

00:04:51,909 --> 00:04:49,759

after nearly three years

93

00:04:53,430 --> 00:04:51,919

hundreds of thousands of hours logged by

94

00:04:55,110 --> 00:04:53,440

engineers

95

00:04:56,469 --> 00:04:55,120

technicians

96

00:04:58,230 --> 00:04:56,479

scientists

97

00:04:59,749 --> 00:04:58,240

seamstresses

98

00:05:01,590 --> 00:04:59,759

electricians

99

00:05:03,670 --> 00:05:01,600

and other program workers across the

100

00:05:06,150 --> 00:05:03,680

globe

101
00:05:07,510 --> 00:05:06,160
we have main engines start two

102
00:05:11,110 --> 00:05:07,520
one

103
00:05:13,830 --> 00:05:12,390
the shuttle

104
00:05:19,590 --> 00:05:13,840
makes its way

105
00:05:24,310 --> 00:05:21,270
at liftoff

106
00:05:26,870 --> 00:05:24,320
6.6 million pounds of thrust begin

107
00:05:28,790 --> 00:05:26,880
hurtling the vehicle and crew at speeds

108
00:05:33,590 --> 00:05:28,800
that will reach 17

109
00:05:36,870 --> 00:05:35,350
the shuttle is like no other machine

110
00:05:39,029 --> 00:05:36,880
ever built

111
00:05:40,710 --> 00:05:39,039
for its launch to succeed more than a

112
00:05:43,000 --> 00:05:40,720
million parts must move together

113
00:05:44,100 --> 00:05:43,010

perfectly

114

00:05:47,110 --> 00:05:44,110

[Music]

115

00:05:49,590 --> 00:05:47,120

[Applause]

116

00:05:52,070 --> 00:05:49,600

how this engineering marvel came to be

117

00:05:54,469 --> 00:05:52,080

is an amazing story that begins in the

118

00:05:56,390 --> 00:05:54,479

early 1970s

119

00:05:59,029 --> 00:05:56,400

a new mission is sought for nasa to send

120

00:06:00,870 --> 00:05:59,039

humans into space but mars

121

00:06:03,749 --> 00:06:00,880

for many the next logical step on the

122

00:06:06,550 --> 00:06:03,759

path of exploration is dismissed as too

123

00:06:09,830 --> 00:06:06,560

costly a destination for a country

124

00:06:13,990 --> 00:06:09,840

preoccupied with events back on earth

125

00:06:16,810 --> 00:06:14,000

instead on january 5th 1972

126

00:06:18,870 --> 00:06:16,820

another destination is selected

127

00:06:21,670 --> 00:06:18,880

[Music]

128

00:06:24,390 --> 00:06:21,680

low earth orbit president nixon really

129

00:06:26,390 --> 00:06:24,400

liked the idea and uh and and told the

130

00:06:28,150 --> 00:06:26,400

nasa administrator go do it

131

00:06:30,309 --> 00:06:28,160

and the nasa administrator got a call

132

00:06:31,430 --> 00:06:30,319

from omb the next morning someone there

133

00:06:33,110 --> 00:06:31,440

and said hey

134

00:06:35,510 --> 00:06:33,120

what the president really meant to say

135

00:06:38,550 --> 00:06:35,520

was you're going to get this much money

136

00:06:40,710 --> 00:06:38,560

and so do as best you can

137

00:06:42,150 --> 00:06:40,720

with the space transportation system and

138

00:06:43,029 --> 00:06:42,160

our choice

139

00:06:45,110 --> 00:06:43,039

uh

140

00:06:46,950 --> 00:06:45,120

logically was we have to have a vehicle

141

00:06:49,270 --> 00:06:46,960

first and so that that was the birth of

142

00:06:51,430 --> 00:06:49,280

the space shuttle as the first in the

143

00:06:54,070 --> 00:06:51,440

three-part space transportation system

144

00:06:55,830 --> 00:06:54,080

many designs were considered often they

145

00:06:56,950 --> 00:06:55,840

combined the best features of different

146

00:06:59,990 --> 00:06:56,960

concepts

147

00:07:02,870 --> 00:07:00,000

one was the use of a lifting body an

148

00:07:04,870 --> 00:07:02,880

aircraft with no conventional wings only

149

00:07:07,350 --> 00:07:04,880

its fuselage would keep the aircraft

150

00:07:08,230 --> 00:07:07,360

airborne and guide it safely back to

151
00:07:10,230 --> 00:07:08,240
earth

152
00:07:12,710 --> 00:07:10,240
at that time they were looking at having

153
00:07:14,629 --> 00:07:12,720
jet engines on the shuttle for landing

154
00:07:16,469 --> 00:07:14,639
and for transporting it across the

155
00:07:18,870 --> 00:07:16,479
country

156
00:07:21,749 --> 00:07:18,880
they were known as the flying bathtubs

157
00:07:24,870 --> 00:07:21,759
for the first test the m2f1 was towed

158
00:07:27,350 --> 00:07:24,880
behind a car a souped-up pontiac

159
00:07:29,670 --> 00:07:27,360
whitey whitesides drove that pontiac

160
00:07:32,629 --> 00:07:29,680
across like that at about 120 miles per

161
00:07:35,350 --> 00:07:32,639
hour dragging this flying bathtub behind

162
00:07:37,110 --> 00:07:35,360
it as well as groundbreaking their tests

163
00:07:45,589 --> 00:07:37,120

could also prove

164

00:07:51,350 --> 00:07:48,629

september 1976 more than four and a half

165

00:07:52,869 --> 00:07:51,360

years after president nixon signed off

166

00:07:56,150 --> 00:07:52,879

on its development

167

00:07:58,309 --> 00:07:56,160

america's new spacecraft constitution

168

00:08:00,469 --> 00:07:58,319

gets its first close-up before the

169

00:08:02,390 --> 00:08:00,479

cameras the arbiter itself was well

170

00:08:04,950 --> 00:08:02,400

received by the public but impassioned

171

00:08:07,589 --> 00:08:04,960

fans of a particular long cancelled

172

00:08:09,990 --> 00:08:07,599

television series called star trek

173

00:08:12,550 --> 00:08:10,000

wanted it called something else they

174

00:08:14,790 --> 00:08:12,560

staged a successful write-in campaign

175

00:08:17,990 --> 00:08:14,800

and the orbiter was renamed for the

176

00:08:20,710 --> 00:08:18,000

starship featured on the show thus

177

00:08:21,990 --> 00:08:20,720

nasa's new shuttle would be the

178

00:08:23,510 --> 00:08:22,000

enterprise

179

00:08:31,510 --> 00:08:23,520

boldly going

180

00:08:35,350 --> 00:08:33,190

whatever its name

181

00:08:36,409 --> 00:08:35,360

this bird still needed to prove he could

182

00:08:42,020 --> 00:08:36,419

fly

183

00:08:46,710 --> 00:08:43,589

[Music]

184

00:08:48,550 --> 00:08:46,720

in an age before computer simulations

185

00:08:51,110 --> 00:08:48,560

balsa wood models and wind tunnel

186

00:08:53,269 --> 00:08:51,120

testing was the only means to test the

187

00:08:55,829 --> 00:08:53,279

airliner sized glider

188

00:08:58,230 --> 00:08:55,839

we put together a very aggressive uh

189

00:09:00,389 --> 00:08:58,240

flight test profile that consisted of

190

00:09:03,030 --> 00:09:00,399

data points continuously all the way

191

00:09:05,590 --> 00:09:03,040

down they were just not there was not a

192

00:09:08,150 --> 00:09:05,600

matter of 10 seconds went by without

193

00:09:11,269 --> 00:09:08,160

another either pitch doublet or a rudder

194

00:09:13,430 --> 00:09:11,279

kick or an angle of attack sweep

195

00:09:15,350 --> 00:09:13,440

the things that really turn on a test

196

00:09:18,310 --> 00:09:15,360

pilot to fly them as accurately as

197

00:09:20,310 --> 00:09:18,320

possible august 12 1977

198

00:09:22,389 --> 00:09:20,320

on a crystal clear california morning

199

00:09:24,550 --> 00:09:22,399

high above the mojave desert

200

00:09:26,310 --> 00:09:24,560

two nasa test pilots ready for

201
00:09:27,350 --> 00:09:26,320
enterprises first flight

202
00:09:30,070 --> 00:09:27,360
the plan

203
00:09:32,389 --> 00:09:30,080
was for fred hayes jr and gordon

204
00:09:34,470 --> 00:09:32,399
fullerton to lift the orbiter off a

205
00:09:37,670 --> 00:09:34,480
modified 747

206
00:09:43,060 --> 00:09:37,680
then land on a dry lake bed 15 000 feet

207
00:10:13,590 --> 00:09:50,070
[Music]

208
00:10:17,750 --> 00:10:15,750
colombia nasa's first orbiter is

209
00:10:21,350 --> 00:10:17,760
fittingly named after the first american

210
00:10:23,269 --> 00:10:21,360
vessel to circumnavigate the globe

211
00:10:25,350 --> 00:10:23,279
while the new class of nasa astronauts

212
00:10:28,470 --> 00:10:25,360
trained for subsequent shuttle flights

213
00:10:31,030 --> 00:10:28,480

columbia was undergoing preparations for

214

00:10:33,590 --> 00:10:31,040

the program's maiden voyage

215

00:10:35,670 --> 00:10:33,600

sts-1

216

00:10:37,670 --> 00:10:35,680

veteran astronaut john young one of the

217

00:10:40,310 --> 00:10:37,680

12 men to set foot on the moon

218

00:11:06,389 --> 00:10:40,320

is in command his pilot is first-time

219

00:11:11,350 --> 00:11:07,910

together they would travel over a

220

00:11:12,230 --> 00:11:11,360

million miles and circle the earth 36

221

00:11:13,750 --> 00:11:12,240

times

222

00:11:15,190 --> 00:11:13,760

john used to says hey they're

223

00:11:16,550 --> 00:11:15,200

getting ready to light off seven million

224

00:11:17,750 --> 00:11:16,560

pounds of thrust under you and you're a

225

00:11:19,269 --> 00:11:17,760

little bit

226

00:11:20,710 --> 00:11:19,279

excited you don't know what's going on

227

00:11:22,790 --> 00:11:20,720

they both john and i knew what was going

228

00:11:25,509 --> 00:11:22,800

on launched like a rocket two days

229

00:11:27,670 --> 00:11:25,519

earlier columbia lands as a glider on

230

00:11:29,590 --> 00:11:27,680

the dry lake bed of edwards air force

231

00:11:31,509 --> 00:11:29,600

base in california we do a big turn

232

00:11:32,949 --> 00:11:31,519

around to land on the lake bed after

233

00:11:35,110 --> 00:11:32,959

that first flight i remember when john

234

00:11:37,030 --> 00:11:35,120

went into a bank on the big left bank i

235

00:11:39,509 --> 00:11:37,040

looked down to lake bed and there's

236

00:11:41,350 --> 00:11:39,519

thousands of people out there

237

00:11:45,990 --> 00:11:41,360

look at all those folks

238

00:11:50,470 --> 00:11:48,150

anyone who was associated with the

239

00:11:52,949 --> 00:11:50,480

program or there just to see the shuttle

240

00:11:56,470 --> 00:11:52,959

return i think felt a lot of pride in

241

00:11:57,350 --> 00:11:56,480

our country and our space program and so

242

00:11:59,670 --> 00:11:57,360

that

243

00:12:01,910 --> 00:11:59,680

those emotions were you know finally

244

00:12:04,949 --> 00:12:01,920

released and you said wow you know the

245

00:12:07,910 --> 00:12:04,959

flight was done safely they're back home

246

00:12:09,590 --> 00:12:07,920

uh the shuttle really does work it's a

247

00:12:10,370 --> 00:12:09,600

great program it's got a great future

248

00:12:14,629 --> 00:12:10,380

ahead of

249

00:12:18,069 --> 00:12:16,790

liftoff has been challenging

250

00:12:22,069 --> 00:12:18,079

columbia

251
00:12:24,870 --> 00:12:22,079
recovery and the shuttle has cleared us

252
00:12:27,190 --> 00:12:24,880
for more than 30 years the fleet and

253
00:12:29,590 --> 00:12:27,200
thousands of americans dedicated to its

254
00:12:31,350 --> 00:12:29,600
safety and success have toiled in

255
00:12:34,470 --> 00:12:31,360
exhilarating triumph

256
00:12:36,230 --> 00:12:34,480
heartbreaking tragedy and most often

257
00:12:38,629 --> 00:12:36,240
quiet obscurity

258
00:12:40,310 --> 00:12:38,639
their contributions have extended beyond

259
00:12:41,590 --> 00:12:40,320
the bounds of space

260
00:12:43,190 --> 00:12:41,600
among others

261
00:12:45,350 --> 00:12:43,200
shuttle derived technologies have been

262
00:12:46,870 --> 00:12:45,360
used in developing an artificial heart

263
00:12:48,389 --> 00:12:46,880

and limbs three-dimensional

264

00:12:50,710 --> 00:12:48,399

biotechnology

265

00:12:52,790 --> 00:12:50,720

a light for treating tumors in children

266

00:12:56,389 --> 00:12:52,800

and improving crime prevention and

267

00:13:00,550 --> 00:12:58,069

from crawler driver

268

00:13:04,629 --> 00:13:00,560

to payload specialists

269

00:13:07,350 --> 00:13:04,639

from scuba dive to pilot

270

00:13:10,150 --> 00:13:07,360

from scientists to engineer

271

00:13:13,350 --> 00:13:10,160

they and many like throughout the nation

272

00:13:16,470 --> 00:13:13,360

share a commitment to sending humankind

273

00:13:18,389 --> 00:13:16,480

safely into space

274

00:13:19,590 --> 00:13:18,399

that dedication as much as any other

275

00:13:21,430 --> 00:13:19,600

acclaim

276
00:13:23,030 --> 00:13:21,440
will be the legacy

277
00:13:25,670 --> 00:13:23,040
of america's

278
00:13:28,710 --> 00:13:25,680
space shuttle i think

279
00:13:30,790 --> 00:13:28,720
we'll be remembered in

280
00:13:33,910 --> 00:13:30,800
thousands of years you know as perhaps

281
00:13:36,710 --> 00:13:33,920
the most incredible technological uh

282
00:13:38,230 --> 00:13:36,720
feat of humans of our time as is the

283
00:13:39,990 --> 00:13:38,240
order of life

284
00:13:43,430 --> 00:13:40,000
an ending for the space shuttle becomes

285
00:13:44,550 --> 00:13:43,440
a beginning for a space-bound successor

286
00:13:47,750 --> 00:13:44,560
soon

287
00:13:48,790 --> 00:13:47,760
america will again send astronauts into

288
00:13:53,030 --> 00:13:48,800

orbit