



1
00:01:06,130 --> 00:01:03,250
welcome to this edition of space works

2
00:01:08,110 --> 00:01:06,140
I'm Lynn Bondurant during this show

3
00:01:11,410 --> 00:01:08,120
we'll see pictures not only relating to

4
00:01:13,300 --> 00:01:11,420
space but aeronautics stories include

5
00:01:15,640 --> 00:01:13,310
dedication of the world's biggest wind

6
00:01:17,910 --> 00:01:15,650
tunnels and how students use school

7
00:01:21,370 --> 00:01:17,920
buses to simulate space shuttle missions

8
00:01:23,770 --> 00:01:21,380
but first let's see computer animation

9
00:01:26,650 --> 00:01:23,780
from the NASA Jet Propulsion Laboratory

10
00:01:29,440 --> 00:01:26,660
in California which shows a distant moon

11
00:01:45,670 --> 00:01:29,450
call Miranda that circles the planet

12
00:02:59,010 --> 00:02:18,590
you

13
00:03:03,630 --> 00:03:01,170

since the days of the Wright brother's

14

00:03:05,640 --> 00:03:03,640

airplane designers have been using wind

15

00:03:07,950 --> 00:03:05,650

tunnels to check the effect of wind

16

00:03:10,740 --> 00:03:07,960

pressures on the airplane models placed

17

00:03:12,420 --> 00:03:10,750

in the tunnels for our next story we're

18

00:03:15,120 --> 00:03:12,430

going to the NASA Ames Research Center

19

00:03:17,010 --> 00:03:15,130

near in San Francisco where the world's

20

00:03:21,210 --> 00:03:17,020

biggest wind tunnels were dedicated in

21

00:03:23,070 --> 00:03:21,220

December 1987 modification of the

22

00:03:26,370 --> 00:03:23,080

world's largest closed-circuit wind

23

00:03:28,770 --> 00:03:26,380

tunnel the Ames 40 by 80-foot began in

24

00:03:30,630 --> 00:03:28,780

nineteen eighty the tunnel had been used

25

00:03:33,510 --> 00:03:30,640

for decades before then to test

26
00:03:42,280 --> 00:03:33,520
full-scale aircraft but engineers wanted

27
00:03:48,530 --> 00:03:45,980
although an accident in 1982 caused

28
00:03:50,930 --> 00:03:48,540
damage which delayed the project the

29
00:03:53,600 --> 00:03:50,940
goal of making a new test section more

30
00:03:57,080 --> 00:03:53,610
than two times as big as the old one was

31
00:03:59,960 --> 00:03:57,090
accomplished and the old 40 by an 80

32
00:04:03,980 --> 00:03:59,970
foot section though smaller and his

33
00:04:07,220 --> 00:04:03,990
speed increase from 230 to 345 miles per

34
00:04:10,610 --> 00:04:07,230
hour now let's see a videotape prepared

35
00:04:13,280 --> 00:04:10,620
for the December 1987 dedication which

36
00:04:18,530 --> 00:04:13,290
gives us more detail including wind

37
00:04:20,060 --> 00:04:18,540
tunnel link up to computers at Ames

38
00:04:22,400 --> 00:04:20,070

Research Center the world's most

39

00:04:24,800 --> 00:04:22,410

powerful super computing capability is

40

00:04:26,750 --> 00:04:24,810

teamed with state-of-the-art min tunnels

41

00:04:31,719 --> 00:04:26,760

to form the first steps along the

42

00:04:34,209 --> 00:04:31,729

critical path from computation to flight

43

00:04:36,010 --> 00:04:34,219

the national full-scale aerodynamics

44

00:04:38,469 --> 00:04:36,020

complex at the Ames Research Center in

45

00:04:41,140 --> 00:04:38,479

California is the world's largest wind

46

00:04:42,670 --> 00:04:41,150

tunnel this unique facility provides the

47

00:04:44,499 --> 00:04:42,680

United States with the capability of

48

00:04:46,689 --> 00:04:44,509

performing ground-based aerodynamic

49

00:04:49,420 --> 00:04:46,699

experiments on large scale and full

50

00:04:51,760 --> 00:04:49,430

scale aerospace vehicles and components

51
00:04:53,679 --> 00:04:51,770
low speed aerodynamic research is

52
00:04:56,379 --> 00:04:53,689
conducted in related fundamental flow

53
00:04:58,089 --> 00:04:56,389
phenomenon research activities include

54
00:05:00,369 --> 00:04:58,099
investigations of the aerodynamic

55
00:05:02,890 --> 00:05:00,379
performance and control required for

56
00:05:05,110 --> 00:05:02,900
efficient takeoff climb and landing for

57
00:05:06,969 --> 00:05:05,120
all classes of aircraft and the acoustic

58
00:05:10,119 --> 00:05:06,979
implications related to these flight

59
00:05:12,309 --> 00:05:10,129
phases this extraordinary complex

60
00:05:14,649 --> 00:05:12,319
includes the 40 by 80-foot wind tunnel

61
00:05:16,899 --> 00:05:14,659
the new 80 x 120 wind tunnel and the

62
00:05:19,600 --> 00:05:16,909
outdoor aerodynamic research facility

63
00:05:21,700 --> 00:05:19,610

this complex is the crown jewel of an

64

00:05:24,070 --> 00:05:21,710

elaborate system of wind tunnels at Ames

65

00:05:26,709 --> 00:05:24,080

the impact is committed to contributing

66

00:05:29,469 --> 00:05:26,719

to United States aerospace leadership

67

00:05:31,329 --> 00:05:29,479

and to developing technology to keep us

68

00:05:35,110 --> 00:05:31,339

commercial aircraft in a strong

69

00:05:37,449 --> 00:05:35,120

world-class position even by the

70

00:05:38,829 --> 00:05:37,459

mid-1930s the wind tunnels of the

71

00:05:41,649 --> 00:05:38,839

national advisory committee for

72

00:05:43,899 --> 00:05:41,659

aeronautics NACA had helped transform

73

00:05:46,739 --> 00:05:43,909

the wire and rag biplanes of World War

74

00:05:49,029 --> 00:05:46,749

one into metal low-wing monoplane

75

00:05:51,339 --> 00:05:49,039

accelerated wartime research in Europe

76

00:05:53,439 --> 00:05:51,349

spurred NACA to initiate the

77

00:05:55,420 --> 00:05:53,449

construction of a whole new aeronautical

78

00:05:57,730 --> 00:05:55,430

laboratory out west in mountain view

79

00:06:00,339 --> 00:05:57,740

california on December twentieth

80

00:06:02,589 --> 00:06:00,349

nineteen thirty-nine NACA broke ground

81

00:06:04,989 --> 00:06:02,599

on their new laboratory facilities 40

82

00:06:06,909 --> 00:06:04,999

miles south of San Francisco at Moffett

83

00:06:09,969 --> 00:06:06,919

Field which is now the ames research

84

00:06:11,709 --> 00:06:09,979

center of nasa the overriding military

85

00:06:13,689 --> 00:06:11,719

need of the moment was the testing of

86

00:06:17,110 --> 00:06:13,699

new aircraft designs at moderate speeds

87

00:06:17,910 --> 00:06:17,120

in 1941 the mammoth construction task of

88

00:06:20,070 --> 00:06:17,920

this wind tunnel

89

00:06:22,290 --> 00:06:20,080

began at Ames and two and a half years

90

00:06:24,150 --> 00:06:22,300

later in June nineteen forty four the

91

00:06:27,420 --> 00:06:24,160

full-scale wind tunnel went into

92

00:06:29,250 --> 00:06:27,430

operation this 40-foot by 80-foot low

93

00:06:31,440 --> 00:06:29,260

speed wind tunnel was an invaluable

94

00:06:33,750 --> 00:06:31,450

addition to NACA's array of tunnels

95

00:06:35,790 --> 00:06:33,760

since it was big enough to handle all

96

00:06:38,850 --> 00:06:35,800

but the largest bombers and transports

97

00:06:41,040 --> 00:06:38,860

with their engines operating the

98

00:06:42,780 --> 00:06:41,050

full-scale tests in the 40 x 80 foot

99

00:06:44,820 --> 00:06:42,790

tunnel led to research results that in

100

00:06:48,330 --> 00:06:44,830

time actually made great improvements in

101
00:06:51,120 --> 00:06:48,340
aircraft design and operations in the

102
00:06:53,910 --> 00:06:51,130
early years NACA wind tunnel tests

103
00:06:56,220 --> 00:06:53,920
provided the Douglas X sbd to dive

104
00:06:58,500 --> 00:06:56,230
bomber with a modified wing flap system

105
00:07:01,140 --> 00:06:58,510
that lowered landing speeds from 90 to

106
00:07:02,610 --> 00:07:01,150
84 miles per hour this small game

107
00:07:04,740 --> 00:07:02,620
allowed the use of better

108
00:07:07,470 --> 00:07:04,750
high-performance fighters on our Navy's

109
00:07:10,620 --> 00:07:07,480
carriers thus saving lives and aircraft

110
00:07:13,020 --> 00:07:10,630
in the 50s and 60s the 40 x 80 wind

111
00:07:14,790 --> 00:07:13,030
tunnel contributed significantly to the

112
00:07:18,120 --> 00:07:14,800
development of jet aircraft control

113
00:07:20,190 --> 00:07:18,130

systems and stability the 40 x 80 foot

114

00:07:22,350 --> 00:07:20,200

wind tunnel covered eight acres of land

115

00:07:25,350 --> 00:07:22,360

the air circuit was just over a half

116

00:07:27,690 --> 00:07:25,360

mile long and was operated by six forty

117

00:07:30,270 --> 00:07:27,700

foot diameter fans each powered by a

118

00:07:32,510 --> 00:07:30,280

6,000 horsepower electric motor which

119

00:07:36,510 --> 00:07:32,520

could maintain airflow at speeds up to

120

00:07:38,520 --> 00:07:36,520

230 miles per hour over the years this

121

00:07:40,590 --> 00:07:38,530

tunnel became the primary facility in

122

00:07:42,960 --> 00:07:40,600

the country for investigating the flying

123

00:07:45,690 --> 00:07:42,970

characteristics of large scale and full

124

00:07:47,670 --> 00:07:45,700

scale aircraft and components with the

125

00:07:49,470 --> 00:07:47,680

advent of the jet age the tunnel was

126
00:07:50,940 --> 00:07:49,480
used to explore the landing and takeoff

127
00:07:53,640 --> 00:07:50,950
characteristics of the new aircraft

128
00:07:56,040 --> 00:07:53,650
these two critical periods of flight are

129
00:07:58,980 --> 00:07:56,050
extremely sensitive in terms of lift

130
00:08:01,050 --> 00:07:58,990
drag and stability in more recent years

131
00:08:03,240 --> 00:08:01,060
NASA became the focal point for

132
00:08:05,850 --> 00:08:03,250
extensive research unpowered lift

133
00:08:08,460 --> 00:08:05,860
aircraft rotorcraft and other vertical

134
00:08:10,050 --> 00:08:08,470
takeoff and landing aircraft in the case

135
00:08:11,790 --> 00:08:10,060
of the VTOL aircraft

136
00:08:13,379 --> 00:08:11,800
tunnel tests explored the critical

137
00:08:15,600 --> 00:08:13,389
flight regime where the vehicle makes

138
00:08:17,790 --> 00:08:15,610

the transition from Howard lift at low

139

00:08:21,300 --> 00:08:17,800

forward speeds to wing born left at

140

00:08:22,860 --> 00:08:21,310

higher speeds the 40 by 80 also aided in

141

00:08:25,470 --> 00:08:22,870

the study of structural dynamics of

142

00:08:28,320 --> 00:08:25,480

advanced helicopter rotors and new VTOL

143

00:08:30,210 --> 00:08:28,330

aircraft in many cases these studies led

144

00:08:33,300 --> 00:08:30,220

to successful modifications for their

145

00:08:35,279 --> 00:08:33,310

future design and flight the 40 by 80

146

00:08:37,709 --> 00:08:35,289

was so successful in testing full scale

147

00:08:39,510 --> 00:08:37,719

aircraft that 35 years after its initial

148

00:08:43,680 --> 00:08:39,520

start up the tunnel power was increased

149

00:08:45,810 --> 00:08:43,690

to 130 5,000 horsepower modifications

150

00:08:48,540 --> 00:08:45,820

were begun to incorporate a new leg of

151
00:08:50,400 --> 00:08:48,550
the tunnel with an 80 x 120 foot section

152
00:08:54,120 --> 00:08:50,410
where even large conventional aircraft

153
00:08:57,150 --> 00:08:54,130
rotorcraft and VTOL stl aircraft could

154
00:08:58,710 --> 00:08:57,160
be accommodated modifications of an

155
00:09:00,450 --> 00:08:58,720
existing structure can frequently be

156
00:09:02,670 --> 00:09:00,460
more challenging than building a new one

157
00:09:04,860 --> 00:09:02,680
the central area of concern in this

158
00:09:07,260 --> 00:09:04,870
instance was replacing the original six

159
00:09:09,570 --> 00:09:07,270
6,000 horsepower drive motors with an

160
00:09:12,030 --> 00:09:09,580
enlarged horse power capacity system all

161
00:09:13,829 --> 00:09:12,040
within the original space by using

162
00:09:16,290 --> 00:09:13,839
synchronous motors with controllable

163
00:09:18,930 --> 00:09:16,300

pitch fans at variable frequency speed

164

00:09:20,490 --> 00:09:18,940

controls the new drive system was fitted

165

00:09:23,040 --> 00:09:20,500

into the existing motor support

166

00:09:24,660 --> 00:09:23,050

structure the new fans design was more

167

00:09:27,000 --> 00:09:24,670

efficient and took advantage of the

168

00:09:29,550 --> 00:09:27,010

latest acoustic technology for reduction

169

00:09:32,550 --> 00:09:29,560

of noise during tunnel testing thus the

170

00:09:34,920 --> 00:09:32,560

new 80 x 120 wind tunnel was born there

171

00:09:38,360 --> 00:09:34,930

by tripling the test section area of the

172

00:09:41,070 --> 00:09:38,370

original 40 by 80 foot tunnel in 1958

173

00:09:42,660 --> 00:09:41,080

NACA was reorganized by an act of

174

00:09:44,100 --> 00:09:42,670

Congress and became known as the

175

00:09:46,410 --> 00:09:44,110

National Aeronautics and Space

176

00:09:48,600 --> 00:09:46,420

Administration during the 60s

177

00:09:51,060 --> 00:09:48,610

aeronautical research prospered as never

178

00:09:52,560 --> 00:09:51,070

before although NASA is widely known for

179

00:09:55,320 --> 00:09:52,570

its focus on manned and unmanned

180

00:09:57,030 --> 00:09:55,330

spacecraft the agency has continued to

181

00:10:00,630 --> 00:09:57,040

contribute giant strides to aircraft

182

00:10:02,400 --> 00:10:00,640

technology us subsonic jets captured the

183

00:10:04,350 --> 00:10:02,410

world commercial market and became

184

00:10:07,449 --> 00:10:04,360

indispensable to intercontinental travel

185

00:10:09,129 --> 00:10:07,459

as a result of the research at NASA

186

00:10:11,739 --> 00:10:09,139

models in the variable sweep wing and the

187

00:10:13,480 --> 00:10:11,749

improved air foils were invaluable to

188

00:10:16,030 --> 00:10:13,490

more efficient flight in the atmosphere

189

00:10:18,100 --> 00:10:16,040

besides these aerospace contributions

190

00:10:20,259 --> 00:10:18,110

NASA's research has provided

191

00:10:22,150 --> 00:10:20,269

advancements in aircraft efficiency and

192

00:10:24,720 --> 00:10:22,160

safety which have resulted in millions

193

00:10:28,150 --> 00:10:24,730

of dollars in savings to the nation in

194

00:10:30,009 --> 00:10:28,160

the later 60s supersonic transports and

195

00:10:31,840 --> 00:10:30,019

fighters were on the drawing board and

196

00:10:33,850 --> 00:10:31,850

there were a great number of assignments

197

00:10:36,970 --> 00:10:33,860

for the wind tunnels in support of space

198

00:10:39,009 --> 00:10:36,980

flight the NASA wind tunnel was able to

199

00:10:41,169 --> 00:10:39,019

answer those unexpected questions that

200

00:10:43,869 --> 00:10:41,179

always arise when testing radically new

201
00:10:45,850 --> 00:10:43,879
designs this pushed the capabilities of

202
00:10:48,400 --> 00:10:45,860
NASA's wind tunnel facilities and staff

203
00:10:51,759 --> 00:10:48,410
and prove the value of wind tunnels for

204
00:10:53,710 --> 00:10:51,769
high priority programs the Ames wind

205
00:10:55,239 --> 00:10:53,720
tunnels played an important part in the

206
00:10:57,160 --> 00:10:55,249
design and development of the space

207
00:10:59,769 --> 00:10:57,170
shuttle the shuttle being a hybrid

208
00:11:02,139 --> 00:10:59,779
spacecraft aircraft of unusual shape

209
00:11:04,299 --> 00:11:02,149
operates under extreme flight conditions

210
00:11:06,340 --> 00:11:04,309
and the wind tunnels were needed to test

211
00:11:09,189 --> 00:11:06,350
the complex flow conditions encountered

212
00:11:10,480 --> 00:11:09,199
from launch to orbit to landing even

213
00:11:12,579 --> 00:11:10,490

though these craft operate at high

214

00:11:14,619 --> 00:11:12,589

speeds they all go through the critical

215

00:11:17,109 --> 00:11:14,629

low-speed takeoff and landing conditions

216

00:11:19,449 --> 00:11:17,119

that can be so uniquely tested in the in

217

00:11:21,639 --> 00:11:19,459

fact for such reasons the Space Shuttle

218

00:11:24,009 --> 00:11:21,649

was one of the biggest challenges for

219

00:11:25,749 --> 00:11:24,019

the whole Ames wind tunnel complex the

220

00:11:27,850 --> 00:11:25,759

wind tunnel work paid off and the

221

00:11:30,850 --> 00:11:27,860

unpowered landing tests confirmed the

222

00:11:32,739 --> 00:11:30,860

tunnel test results NASA's contribution

223

00:11:34,689 --> 00:11:32,749

to swept-wing technology aided in the

224

00:11:36,999 --> 00:11:34,699

design of a diverse range of swept-wing

225

00:11:38,829 --> 00:11:37,009

aircraft the wind tunnels for much of

226

00:11:40,960 --> 00:11:38,839

the testing load for the supersonic

227

00:11:43,809 --> 00:11:40,970

transport in the areas of takeoff and

228

00:11:50,049 --> 00:11:43,819

landing transonic acceleration stability

229

00:11:51,970 --> 00:11:50,059

and control and Inlet performance in

230

00:11:54,280 --> 00:11:51,980

order to continue the research success

231

00:11:56,619 --> 00:11:54,290

of the 40 by 80-foot wind tunnel a major

232

00:11:59,470 --> 00:11:56,629

modification to it and construction of

233

00:12:02,289 --> 00:11:59,480

the new 80 x 120 foot open circuit leg

234

00:12:04,960 --> 00:12:02,299

was undertaken this resulted in an

235

00:12:07,329 --> 00:12:04,970

increase of speed to 350 miles per hour

236

00:12:08,919 --> 00:12:07,339

in the 40 x 80 foot test section which

237

00:12:11,559 --> 00:12:08,929

is an important increase in research

238

00:12:14,259 --> 00:12:11,569

capability because of its size and the

239

00:12:16,869 --> 00:12:14,269

speed of 115 miles per hour in the 80 x

240

00:12:17,430 --> 00:12:16,879

120 it will be possible to investigate

241

00:12:19,860 --> 00:12:17,440

polski

242

00:12:22,080 --> 00:12:19,870

rotor systems and the stall aircraft at

243

00:12:24,390 --> 00:12:22,090

very low forward flight speeds in a

244

00:12:26,970 --> 00:12:24,400

ground-based facility with minimal wind

245

00:12:28,740 --> 00:12:26,980

tunnel wall effects its size even

246

00:12:31,560 --> 00:12:28,750

permits the evaluation of actual

247

00:12:33,990 --> 00:12:31,570

aircraft as large as a Boeing 737 jet

248

00:12:36,330 --> 00:12:34,000

transport in addition to the tunnels the

249

00:12:38,400 --> 00:12:36,340

outdoor aerodynamic research facility is

250

00:12:40,500 --> 00:12:38,410

used to check out and test aircraft and

251
00:12:42,510 --> 00:12:40,510
models in a static environment before

252
00:12:45,600 --> 00:12:42,520
they are installed in the in fact wind

253
00:12:47,550 --> 00:12:45,610
tunnels the facility is an open-air test

254
00:12:49,500 --> 00:12:47,560
area designed to test models and

255
00:12:52,320 --> 00:12:49,510
instrumentation and collect baseline

256
00:12:54,300 --> 00:12:52,330
data this facility includes a model

257
00:12:56,220 --> 00:12:54,310
mounting pad control room and other

258
00:12:59,310 --> 00:12:56,230
support equipment for remote model or

259
00:13:02,340 --> 00:12:59,320
aircraft operations the Ames 40 x 80

260
00:13:04,230 --> 00:13:02,350
foot wind tunnel has seen over 550 tests

261
00:13:06,540 --> 00:13:04,240
and hundreds of different aircraft and

262
00:13:09,540 --> 00:13:06,550
models in its Test section of virtually

263
00:13:11,730 --> 00:13:09,550

every major airframe design all three

264

00:13:13,830 --> 00:13:11,740

areas of the aerodynamics complex have

265

00:13:15,720 --> 00:13:13,840

been updated and equipped for the future

266

00:13:18,540 --> 00:13:15,730

research that will bring us all into a

267

00:13:20,610 --> 00:13:18,550

new technological age the combination of

268

00:13:22,890 --> 00:13:20,620

dedicated people and machines working

269

00:13:24,570 --> 00:13:22,900

together from computation to flight

270

00:13:27,030 --> 00:13:24,580

since the Wright brothers and their

271

00:13:30,030 --> 00:13:27,040

successors will continue on into the

272

00:13:32,640 --> 00:13:30,040

Space Age undoubtedly aerospace vehicles

273

00:13:35,100 --> 00:13:32,650

not even yet conceived will fly in this

274

00:13:37,350 --> 00:13:35,110

NASA wind tunnel before they embark on

275

00:13:39,870 --> 00:13:37,360

their future Aviation destinies in our

276

00:13:42,450 --> 00:13:39,880

atmosphere or perhaps to the planets

277

00:13:44,400 --> 00:13:42,460

beyond the in fact wind tunnels have

278

00:13:46,980 --> 00:13:44,410

carried the burden of technical advances

279

00:13:49,140 --> 00:13:46,990

in aeronautics as well as in space the

280

00:13:51,660 --> 00:13:49,150

years of technical successes result from

281

00:13:53,490 --> 00:13:51,670

a truly innovative direction spearheaded

282

00:13:55,440 --> 00:13:53,500

by an extremely technically competent

283

00:13:57,210 --> 00:13:55,450

staff which continues to have the

284

00:14:00,329 --> 00:13:57,220

expertise in design excellence and

285

00:14:02,300 --> 00:14:00,339

extreme research versatility several

286

00:14:05,460 --> 00:14:02,310

hundred people technicians engineers

287

00:14:07,440 --> 00:14:05,470

designers model fabricators mechanics

288

00:14:10,530 --> 00:14:07,450

and their support personnel are required

289

00:14:12,660 --> 00:14:10,540

to run wind tunnel tests this carefully

290

00:14:14,790 --> 00:14:12,670

assembled team knows how to use the

291

00:14:18,030 --> 00:14:14,800

capabilities of the wind tunnel and use

292

00:14:20,010 --> 00:14:18,040

it wisely our world is shrinking and the

293

00:14:21,790 --> 00:14:20,020

technological advances inspired by our

294

00:14:24,340 --> 00:14:21,800

research here at the National

295

00:14:27,220 --> 00:14:24,350

full scale aerodynamics complex will

296

00:14:29,680 --> 00:14:27,230

promote safer faster and more efficient

297

00:14:31,660 --> 00:14:29,690

means of travel and thereby build closer

298

00:14:33,940 --> 00:14:31,670

communications contribute to

299

00:14:35,889 --> 00:14:33,950

international understanding and perhaps

300

00:14:39,100 --> 00:14:35,899

world peace through technological

301
00:14:42,250 --> 00:14:39,110
advances from the biplanes of World War

302
00:14:44,829 --> 00:14:42,260
1 and pioneering rocket free aerospace

303
00:14:47,110 --> 00:14:44,839
technology has progressed to supersonic

304
00:14:49,060 --> 00:14:47,120
transports spanning the globe space

305
00:14:51,970 --> 00:14:49,070
probes to the planets and manned

306
00:14:54,220 --> 00:14:51,980
landings on the moon winged aerospace

307
00:14:56,470 --> 00:14:54,230
vehicles may someday routinely return

308
00:14:59,019 --> 00:14:56,480
from orbit to a precision landing here

309
00:15:01,449 --> 00:14:59,029
on earth because of this our facilities

310
00:15:03,699 --> 00:15:01,459
and the dedication of our staff promised

311
00:15:07,540 --> 00:15:03,709
a future generation of flight that truly

312
00:15:10,420 --> 00:15:07,550
challenges the imagination now let's go

313
00:15:13,000 --> 00:15:10,430

back to nineteen seventy nine to see

314

00:15:19,540 --> 00:15:13,010

aircraft spin tests at NASA's Wallops

315

00:15:25,060 --> 00:15:19,550

Flight Facility in Virginia for men like

316

00:15:27,550 --> 00:15:25,070

wanly Bill Mims and the rest of the

317

00:15:31,569 --> 00:15:27,560

ground crew it's a job they've done many

318

00:15:35,560 --> 00:15:31,579

times in the past even so it's a job

319

00:15:38,500 --> 00:15:35,570

they don't rush to finish above all what

320

00:15:40,480 --> 00:15:38,510

they do is thorough the data that will

321

00:15:42,400 --> 00:15:40,490

be gathered in today's test flight and

322

00:15:45,040 --> 00:15:42,410

safety of the man who will fly the plane

323

00:15:47,139 --> 00:15:45,050

are dependent on how well they prepare

324

00:15:53,650 --> 00:15:47,149

the plane and its instrumentation before

325

00:15:57,010 --> 00:15:53,660

flight the place is NASA's Wallops

326

00:15:59,710 --> 00:15:57,020

Island Virginia blame the ground crew

327

00:16:02,110 --> 00:15:59,720

has been working on since 530am is a

328

00:16:06,550 --> 00:16:02,120

typical general aviation wide aircraft

329

00:16:08,949 --> 00:16:06,560

and this is the man who will fly it 50

330

00:16:12,970 --> 00:16:08,959

year old engineering research pilot Jim

331

00:16:18,040 --> 00:16:15,590

when Jim Patton takes the plane up for a

332

00:16:22,220 --> 00:16:18,050

spin that's exactly what he'll be doing

333

00:16:23,870 --> 00:16:22,230

making the plane spin on purpose the

334

00:16:25,780 --> 00:16:23,880

research is being done because about

335

00:16:28,730 --> 00:16:25,790

thirty percent of all general aviation

336

00:16:41,939 --> 00:16:28,740

fatalities can be traced to stall spin

337

00:16:47,740 --> 00:16:44,530

repeatedly patent noses the aircraft

338

00:16:56,500 --> 00:16:47,750

skyward till the small plane stalls it

339

00:17:06,020 --> 00:17:01,220

for this mistake very steep five

340

00:17:09,590 --> 00:17:06,030

that's stable seven recovering units

341

00:17:17,840 --> 00:17:09,600

responding slowly a typical slight lasts

342

00:17:19,790 --> 00:17:17,850

about an hour and a half occasionally

343

00:17:22,250 --> 00:17:19,800

when he can't recover from a spins a

344

00:17:27,920 --> 00:17:22,260

parachute mounted in the tail is prompt

345

00:17:29,420 --> 00:17:27,930

to stabilize the spinning plane much of

346

00:17:31,640 --> 00:17:29,430

the data that may one day help

347

00:17:34,460 --> 00:17:31,650

researchers find better ways to design

348

00:17:38,030 --> 00:17:34,470

stall proof aircraft returns to this

349

00:17:40,120 --> 00:17:38,040

telemetry station on the ground here

350

00:17:42,860 --> 00:17:40,130

Paul style and his team of engineers

351

00:17:47,090 --> 00:17:42,870

monitor and record results of the day's

352

00:17:49,010 --> 00:17:47,100

spins research pilot Jim patent pointed

353

00:17:51,620 --> 00:17:49,020

out some of the many modifications that

354

00:17:54,110 --> 00:17:51,630

have been tested on the plane this half

355

00:17:56,780 --> 00:17:54,120

to use live straight the so-called soda

356

00:18:00,530 --> 00:17:56,790

straws under the edges of the fuselage

357

00:18:05,960 --> 00:18:00,540

and the fairing back here which acts as

358

00:18:08,270 --> 00:18:05,970

a ventral we're all sized and located on

359

00:18:10,500 --> 00:18:08,280

the airplane in the spin tunnel on

360

00:18:13,080 --> 00:18:10,510

models

361

00:18:17,529 --> 00:18:13,090

we investigate these singly and in

362

00:18:22,330 --> 00:18:20,139

the full-scale testing is only one part

363

00:18:25,210 --> 00:18:22,340

of the overall effort at the Langley

364

00:18:27,009 --> 00:18:25,220

Research Center engineers test models in

365

00:18:31,570 --> 00:18:27,019

a spin tunnel and several other

366

00:18:36,890 --> 00:18:34,490

on an unused runway in West Point

367

00:18:39,490 --> 00:18:36,900

Virginia south of Richmond another group

368

00:18:41,810 --> 00:18:39,500

of Langley engineers and technicians fly

369

00:18:47,360 --> 00:18:41,820

radio-controlled models of the same

370

00:18:49,610 --> 00:18:47,370

general aviation plane results of these

371

00:18:52,190 --> 00:18:49,620

tests are correlated with results from

372

00:18:55,500 --> 00:18:52,200

both the spin tunnel studies and the

373

00:19:00,430 --> 00:18:55,510

full-scale flight tests

374

00:19:02,410 --> 00:19:00,440

stall spin research an intensive program

375

00:19:04,690 --> 00:19:02,420

aimed at improving stall and spin

376

00:19:07,420 --> 00:19:04,700

characteristics of both presently flying

377

00:19:13,090 --> 00:19:07,430

aircraft and four planes designed in the

378

00:19:15,010 --> 00:19:13,100

future our final story comes from here

379

00:19:19,150 --> 00:19:15,020

at the NASA Lewis Research Center in

380

00:19:21,010 --> 00:19:19,160

Cleveland in April 1987 our educational

381

00:19:23,440 --> 00:19:21,020

services office worked with some of the

382

00:19:26,560 --> 00:19:23,450

Cleveland area schools to create a

383

00:19:39,970 --> 00:19:26,570

special education event a simulated

384

00:19:42,250 --> 00:19:39,980

shuttle mission school children pretend

385

00:19:44,080 --> 00:19:42,260

they are instruments the youngsters

386

00:19:48,430 --> 00:19:44,090

learned through their play during

387

00:19:50,260 --> 00:19:48,440

simulated space shuttle missions nine

388

00:19:52,330 --> 00:19:50,270

elementary and two high schools are

389

00:20:03,910 --> 00:19:52,340

involved in the Space Shuttle simulation

390

00:20:07,330 --> 00:20:03,920

on april eighth 1987 besides science and

391

00:20:09,730 --> 00:20:07,340

math student use art music dance and

392

00:20:23,330 --> 00:20:09,740

many other subject areas to carry out

393

00:20:23,340 --> 00:20:41,629

more than 5,000 students participate

394

00:21:10,570 --> 00:20:44,029

during the project students are many

395

00:21:19,930 --> 00:21:12,770

students are preparing for early morning

396

00:21:19,940 --> 00:21:47,340

students suit up for lunch

397

00:21:47,350 --> 00:22:05,360

experiments in cargo are loaded

398

00:22:27,780 --> 00:22:07,740

volunteers helped to convert ordinary

399

00:22:27,790 --> 00:23:20,320

students train for upcoming missions

400

00:23:27,410 --> 00:23:24,010

it's april eight 1987 in cleveland

401
00:23:29,840 --> 00:23:27,420
launched in a day when nasa Lewis

402
00:23:32,330 --> 00:23:29,850
research center is part of a simulated

403
00:24:05,940 --> 00:23:32,340
shuttle program with the nine area

404
00:24:11,920 --> 00:24:08,950
the students design uniforms and crew

405
00:24:17,380 --> 00:24:11,930
patches study launch and landing 15 and

406
00:24:19,990 --> 00:24:17,390
plan experiments now we're going to see

407
00:24:22,650 --> 00:24:20,000
another experiment by John Roman John

408
00:24:25,540 --> 00:24:22,660
what's the problem of this experiment

409
00:24:28,780 --> 00:24:25,550
well the movement of the shuttle affect

410
00:24:31,240 --> 00:24:28,790
the absorbent rate of colored water and

411
00:24:33,820 --> 00:24:31,250
what's the hypothesis I think the color

412
00:24:36,040 --> 00:24:33,830
of the water is the color that salary

413
00:24:39,010 --> 00:24:36,050

will turn what equipment or materials

414

00:24:41,980 --> 00:24:39,020

are you using drinking glass water

415

00:24:46,210 --> 00:24:41,990

celery stock red food coloring in

416

00:24:49,180 --> 00:24:46,220

o'clock they establish mission control

417

00:24:51,280 --> 00:24:49,190

rooms of their space centers and prepare

418

00:24:54,040 --> 00:24:51,290

flight plans further eventual trip

419

00:24:58,420 --> 00:24:54,050

through the galaxy where they are to

420

00:25:00,520 --> 00:24:58,430

land and explore alien planets the

421

00:25:02,920 --> 00:25:00,530

astronauts use onboard computers and

422

00:25:20,490 --> 00:25:02,930

two-way radios to communicate with other

423

00:25:26,890 --> 00:25:23,590

the night before liftoff each crew

424

00:25:31,420 --> 00:25:26,900

enjoys a sleepover and a pre-flight

425

00:25:41,670 --> 00:25:31,430

breakfast is prepared to and then last

426

00:26:14,320 --> 00:25:41,680

all six five four three two one liftoff

427

00:26:18,799 --> 00:26:16,730

during their travels there is a

428

00:26:21,529 --> 00:26:18,809

rendezvous at the NASA Lewis research

429

00:26:52,499 --> 00:26:21,539

center but point the alien with one

430

00:26:52,509 --> 00:27:49,340

you

431

00:27:53,730 --> 00:27:51,570

that's it for this edition of space

432

00:27:55,470 --> 00:27:53,740

works this is Lynn Bondurant saying

433

00:28:24,220 --> 00:27:55,480

goodbye from the NASA Lewis Research