1
00:00:36,970 --> 00:00:34,540
it was called the National Advisory

2
00:00:39,280 --> 00:00:36,980
Committee for Aeronautics a new

3
00:00:43,119 --> 00:00:39,290
independent agency created by President

4
00:00:45,160 --> 00:00:43,129
Woodrow Wilson in 1915 its job make the

5
00:00:48,189 --> 00:00:45,170
United States a world leader in the

6
00:00:50,470 --> 00:00:48,199
field of Aeronautics in less than three

7
00:00:52,750 --> 00:00:50,480
decades these early pioneers in aviation

8
00:00:55,060 --> 00:00:52,760
and those who followed would be called

9
00:00:57,790 --> 00:00:55,070
upon to think through problems a million

10
00:01:02,380 --> 00:00:57,800
miles away and do it with boldness and

11
00:01:04,420 --> 00:01:02,390
vision by the mid 1950s NACA had modern

12
00:01:16,000 --> 00:01:04,430
wind tunnels and was moving into the

13
00:01:21,860 --> 00:01:20,300

then on October 7th 1957 the US and the

14
00:01:26,150 --> 00:01:21,870
rest of the world were greeted by the

15
00:01:27,560 --> 00:01:26,160
sounds of Sputnik 1 the Soviet Union had

16
00:01:34,550 --> 00:01:27,570
placed the first artificial satellite

17
00:01:36,350 --> 00:01:34,560
into orbit it would not be until early

18
00:01:38,240 --> 00:01:36,360
the following year that America's

19
00:01:40,010 --> 00:01:38,250
satellite Explorer London

20
00:01:42,200 --> 00:01:40,020
successfully orbited the earth and

21
00:01:45,350 --> 00:01:42,210
discovered a dense belt of radiation

22
00:01:47,450 --> 00:01:45,360
surrounding our planet who would have

23
00:01:49,880 --> 00:01:47,460
believed at this early stage that we

24
00:01:52,580 --> 00:01:49,890
will one day move out on the den driven

25
00:01:58,030 --> 00:01:52,590
upwards atmosphere to the very edge of

26
00:02:03,230 --> 00:02:00,710
Project Mercury the country's first

27
00:02:05,510 --> 00:02:03,240
manned spaceflight program was given the

28
00:02:14,010 --> 00:02:05,520
go-ahead just one week after NASA was

29
00:02:23,610 --> 00:02:16,420
seven test pilots were selected to

30
00:02:23,620 --> 00:02:30,130
Alan B Shepard

31
00:02:30,140 --> 00:02:36,400
Walter M schirra

32
00:02:36,410 --> 00:02:41,750
Virgil I Gus Grissom

33
00:02:41,760 --> 00:02:47,890
John h.glenn jr.

34
00:02:47,900 --> 00:02:53,020
Leroy Gordon Cooper

35
00:02:53,030 --> 00:02:58,820
and malcolm scott carpenter

36
00:03:03,710 --> 00:03:01,430
the seven new astronauts spent months

37
00:03:41,850 --> 00:03:03,720
and months undergoing rigorous testing

38
00:03:46,650 --> 00:03:43,890

and while they were being trained

39
00:03:50,240 --> 00:03:46,660
several monkeys took check rides in the

40
00:03:50,250 --> 00:04:17,990
you

41
00:04:21,990 --> 00:04:20,370
meanwhile the orbiting of unmanned

42
00:04:24,930 --> 00:04:22,000
satellites became more and more

43
00:04:26,940 --> 00:04:24,940
commonplace and weather watchers like

44
00:04:28,830 --> 00:04:26,950
tie ropes found a permanent place in our

45
00:04:40,610 --> 00:04:28,840
daily lives by improving weather

46
00:04:47,219 --> 00:04:45,270
on August 12 1960 President Eisenhower

47
00:04:55,409 --> 00:04:47,229
took part in the first transmission of

48
00:04:59,040 --> 00:04:55,419
the echo1 communication satellite it is

49
00:05:01,969 --> 00:04:59,050
a great satisfaction to participate in

50
00:05:04,530 --> 00:05:01,979
this Crist experiment in communications

51
00:05:09,799 --> 00:05:04,540
involving the use of the satellite

52
00:05:52,050 --> 00:05:14,539
on May 5th 1961 astronaut Alan B Shepard

53
00:05:56,980 --> 00:05:54,580
soon after freedom seven landed

54
00:06:04,840 --> 00:05:56,990
President John Kennedy gave NASA an

55
00:06:06,970 --> 00:06:04,850
ambitious new space goal not because

56
00:06:11,110 --> 00:06:06,980
they are easy but because they are hard

57
00:06:14,200 --> 00:06:11,120
because that goal will serve to organize

58
00:06:17,080 --> 00:06:14,210
and measure to the best our energies and

59
00:06:20,020 --> 00:06:17,090
skills because that challenge is one

60
00:06:23,350 --> 00:06:20,030
that were willing to accept one we are

61
00:06:32,140 --> 00:06:23,360
unwilling to postpone and why we can't

62
00:06:36,980 --> 00:06:34,820
after Alan Shepard and Gus Grissom's

63
00:06:39,080 --> 00:06:36,990

test flights for other American

64
00:06:42,110 --> 00:06:39,090
astronauts orbiting in mercury

65
00:06:44,120 --> 00:06:42,120
spacecraft starting the John Glenn he

66
00:07:09,410 --> 00:06:44,130
was followed by spec Buccaneer Wally

67
00:07:43,850 --> 00:07:12,660
all pre-start dialyzer corrector a light

68
00:07:43,860 --> 00:08:02,010
it became clear that

69
00:08:06,640 --> 00:08:04,450
unknowns about the moon were numerous

70
00:08:08,920 --> 00:08:06,650
such things as whether an astronaut

71
00:08:16,090 --> 00:08:08,930
would sink into dust over his head were

72
00:08:17,800 --> 00:08:16,100
a real concern lunar impact studies like

73
00:08:20,350 --> 00:08:17,810
these were carried out in an attempt to

74
00:08:22,900 --> 00:08:20,360
learn researchers fired projectiles

75
00:08:25,300 --> 00:08:22,910
simulating meteors hitting the moon into

76
00:08:27,100 --> 00:08:25,310
sand like and rocky materials and then

77
00:08:39,350 --> 00:08:27,110
measured how much material was thrown

78
00:08:45,120 --> 00:08:42,420
this animation shows how scientists

79
00:08:57,090 --> 00:08:45,130
believe the huge crater Tycho was formed

80
00:09:09,449 --> 00:08:58,840
a series of pictures

81
00:09:15,699 --> 00:09:12,879
then five lunar orbiters photographed

82
00:09:18,759 --> 00:09:15,709
over 90% of the moon's surface including

83
00:09:21,040 --> 00:09:18,769
the never-before-seen backside we saw a

84
00:09:23,740 --> 00:09:21,050
glimpse to of our own planet from lunar

85
00:09:25,869 --> 00:09:23,750
distance but most important of all it

86
00:09:37,049 --> 00:09:25,879
made possible the selection of landing

87
00:09:42,160 --> 00:09:40,090
six surveyor spacecraft made soft

88
00:09:45,780 --> 00:09:42,170

landings on the moon over a two-year

89
00:09:52,440 --> 00:09:49,680
a robot arm dug a trench lunar soil was

90
00:09:59,710 --> 00:09:52,450
like wet sand men and equipment could

91
00:10:03,800 --> 00:10:01,850
panoramic views like these were

92
00:10:14,360 --> 00:10:03,810
assembled from hundreds of individual

93
00:10:19,199 --> 00:10:16,829
Communications via satellite exploded

94
00:10:21,329 --> 00:10:19,209
into a whole new industry that first

95
00:10:32,280 --> 00:10:21,339
live intercontinental transmission by

96
00:10:34,470 --> 00:10:32,290
Telstar one was just the start relay

97
00:10:36,530 --> 00:10:34,480
designed to transmit television

98
00:10:39,180 --> 00:10:36,540
telephone and high-speed data

99
00:10:41,280 --> 00:10:39,190
simcom with Olympic coverage from Tokyo

100
00:10:43,050 --> 00:10:41,290
an early bird want who all were

101
00:11:01,019 --> 00:10:43,060
follow-ons to previous research and

102
00:11:02,850 --> 00:11:01,029
development since rendezvous docking and

103
00:11:05,220 --> 00:11:02,860
having astronauts work outside the

104
00:11:08,819 --> 00:11:05,230
spacecraft critical to lunar missions

105
00:11:11,009 --> 00:11:08,829
NASA began project Gemini using the

106
00:11:13,199 --> 00:11:11,019
mercury capsule as a model the Gemini

107
00:11:16,079 --> 00:11:13,209
spacecraft was enlarged to hold a

108
00:11:21,530 --> 00:11:16,089
two-man crew Gemini would provide design

109
00:12:20,340 --> 00:11:24,569
spectacular first walk in space made by

110
00:12:26,410 --> 00:12:23,410
ten times pairs of astronauts flew into

111
00:12:28,960 --> 00:12:26,420
orbit walking in space rendezvous in and

112
00:12:31,060 --> 00:12:28,970
ducky Gemini had blazed a trail for

113
00:12:52,660 --> 00:12:31,070

project Apollo the three-man spacecraft

114
00:12:57,980 --> 00:12:55,280
more than eight years were poured into

115
00:13:00,889 --> 00:12:57,990
designing building testing and preparing

116
00:13:03,650 --> 00:13:00,899
astronauts rockets and spacecraft for

117
00:14:27,370 --> 00:13:03,660
the first lunar landing here's a visual

118
00:14:34,970 --> 00:14:32,930
in 1967 tragedy struck the nation

119
00:14:36,800 --> 00:14:34,980
mourned the loss of the crew that would

120
00:14:39,590 --> 00:14:36,810
have flown the Apollo spacecraft on its

121
00:14:41,990 --> 00:14:39,600
maiden voyage astronauts Gus Grissom ed

122
00:14:44,180 --> 00:14:42,000
white and Roger Chaffee died in a flash

123
00:14:46,519 --> 00:14:44,190
fire as they were conducting pre-flight

124
00:14:48,800 --> 00:14:46,529
tests on the launch pad the manned

125
00:15:00,040 --> 00:14:48,810
flight schedule was delayed 18 months as

126
00:15:05,060 --> 00:15:02,870
while these changes were being made the

127
00:15:07,760 --> 00:15:05,070
parts and pieces needed to assemble the

128
00:15:11,080 --> 00:15:07,770
giant Saturn v moon rocket came together

129
00:15:13,670 --> 00:15:11,090
at the Kennedy Space Center Florida

130
00:15:19,220 --> 00:15:13,680
everything associated with the saturn v

131
00:15:20,690 --> 00:15:19,230
was huge the rocket itself the building

132
00:15:21,740 --> 00:15:20,700
where it was assembled and the

133
00:15:26,300 --> 00:15:21,750
crawler-transporter

134
00:15:33,210 --> 00:15:30,540
the fully loaded Apollo Saturn 5 was 363

135
00:15:36,600 --> 00:15:33,220
feet tall its main engines alone

136
00:15:39,300 --> 00:15:36,610
generated 160 million horsepower and his

137
00:15:44,130 --> 00:15:39,310
fuel fox pushed fuel to the engines with

138
00:15:46,260 --> 00:15:44,140

a force of 30 diesel locomotives as

139
00:15:48,810 --> 00:15:46,270
Saturn 5 lifted off launch complex 39

140
00:16:31,590 --> 00:15:48,820
for the first time in way more than

141
00:16:37,060 --> 00:16:34,750
the pace quickened starting with Apollo

142
00:17:13,960 --> 00:16:37,070
8 every Saturn 5 launched had a

143
00:17:19,610 --> 00:17:17,210
two days before Christmas in 1968

144
00:17:22,100 --> 00:17:19,620
astronauts Borman Lovell and Anders

145
00:17:24,590 --> 00:17:22,110
became the first humans to pass out of

146
00:17:26,269 --> 00:17:24,600
Earth's gravitational control and into

147
00:17:29,539 --> 00:17:26,279
that of another body in the solar system

148
00:17:31,580 --> 00:17:29,549
the moon the hardware to travel to the

149
00:17:34,700 --> 00:17:31,590
moon had worked well and landing sites

150
00:17:40,790 --> 00:17:37,220
our earth seemed small and fragile

151
00:17:43,010 --> 00:17:40,800
hanging in the vastness of space this

152
00:17:44,510 --> 00:17:43,020
view of ourselves from lunar distance

153
00:17:47,150 --> 00:17:44,520
would change the way we think about

154
00:17:49,400 --> 00:17:47,160
earth for all time it raised profound

155
00:17:51,140 --> 00:17:49,410
questions especially those associated

156
00:17:54,470 --> 00:17:51,150
with the Earth's finiteness and

157
00:17:57,230 --> 00:17:54,480
unlimited resources the next two flights

158
00:17:58,970 --> 00:17:57,240
Apollo's nine and ten would continue

159
00:18:11,000 --> 00:17:58,980
dress rehearsals for the first lunar

160
00:18:15,840 --> 00:18:13,740
astronauts Neil Armstrong Edwin Aldrin

161
00:18:18,270 --> 00:18:15,850
and Michael Collins would make the

162
00:18:37,480 --> 00:18:18,280
historic journey next stop

163
00:18:41,930 --> 00:18:40,100

Neil Armstrong reporting their role and

164
00:18:46,300 --> 00:18:41,940
pitch a program which puts Apollo 11 on

165
00:19:01,480 --> 00:19:00,610
I get out here eat over again eat you go

166
00:19:05,080 --> 00:19:01,490
you're looking great

167
00:19:06,400 --> 00:19:05,090
coming up nine minutes II we're now in

168
00:19:07,560 --> 00:19:06,410
the approach phase everything looking

169
00:19:11,820 --> 00:19:07,570
good

170
00:19:15,840 --> 00:19:11,830
altitude 4215 yourself for landing over

171
00:19:20,950 --> 00:19:15,850
20 feet down two and a half cups of that

172
00:19:23,770 --> 00:19:20,960
city feet go to a down take down for

173
00:19:35,130 --> 00:19:23,780
forward or falling drip into the right

174
00:19:45,630 --> 00:19:39,240
not backbite and gaudy baby people and

175
00:21:24,630 --> 00:19:45,640
women at one all fifth man won by a

176
00:22:04,359 --> 00:21:26,730
across the country and around the world

177
00:22:09,739 --> 00:22:07,279
meanwhile more than 100 scientists from

178
00:22:22,940 --> 00:22:09,749
here and abroad began intensive studies

179
00:22:27,450 --> 00:22:25,530
before project Apollo ended six

180
00:22:55,500 --> 00:22:27,460
additional flights to the moon were made

181
00:23:01,570 --> 00:22:58,450
Skylab was the next man spaceflight

182
00:23:08,910 --> 00:23:01,580
launch first was a two-story orbital

183
00:23:15,010 --> 00:23:12,160
then the first of three three-man crews

184
00:23:18,610 --> 00:23:15,020
departed to me to join and begin living

185
00:23:21,820 --> 00:23:18,620
in the orbiting laboratory those crews

186
00:23:24,070 --> 00:23:21,830
would stay 28 59 and 84 days

187
00:23:26,470 --> 00:23:24,080
respectively one of the major objectives

188
00:23:28,690 --> 00:23:26,480

was to find out if astronauts could

189
00:23:31,030 --> 00:23:28,700
physically withstand extended stays in

190
00:23:38,490 --> 00:23:31,040
space and continue to do useful work

191
00:23:51,630 --> 00:23:43,780
experiments in astronomy earth resources

192
00:23:54,820 --> 00:23:51,640
observations materials processing and

193
00:24:05,380 --> 00:23:54,830
crystal growth all proved highly

194
00:24:07,750 --> 00:24:05,390
successful then ASTP apollo-soyuz test

195
00:24:10,210 --> 00:24:07,760
project a joint endeavor between the

196
00:24:12,280 --> 00:24:10,220
Soviet Union and the United States the

197
00:24:14,440 --> 00:24:12,290
mission called for a mutual docking and

198
00:24:16,510 --> 00:24:14,450
crew exchange to develop the necessary

199
00:24:28,549 --> 00:24:16,520
equipment for international space

200
00:24:33,450 --> 00:24:31,830
before during and after Apollo Skylab

201
00:24:36,330 --> 00:24:33,460
and ASTP

202
00:24:38,669 --> 00:24:36,340
NASA's unmanned planetary programs were

203
00:24:40,470 --> 00:24:38,679
giving scientists exciting new glimpses

204
00:24:43,019 --> 00:24:40,480
into the history of the solar system

205
00:24:46,200 --> 00:24:43,029
from early explorers to the infrared

206
00:24:49,139 --> 00:24:46,210
astronomy satellite 7 Mariner spacecraft

207
00:24:51,600 --> 00:24:49,149
flew by the planets Mars Venus and

208
00:24:58,850 --> 00:24:51,610
Mercury sending back a stream of

209
00:25:04,460 --> 00:25:01,669
ten pioneer spacecraft did like one us

210
00:25:07,750 --> 00:25:04,470
including Jupiter flybys and probes to

211
00:25:17,300 --> 00:25:07,760
the atmosphere of Venus

212
00:25:31,480 --> 00:25:20,100
Pioneer 10 became the first man-made

213
00:25:38,270 --> 00:25:34,790

atmosphere physics astronomy meteorology

214
00:25:40,730 --> 00:25:38,280
and geodesy these are just a few of the

215
00:25:43,100 --> 00:25:40,740
scientific disciplines studied by dozens

216
00:26:09,170 --> 00:25:43,110
of Explorer class orbiters through the

217
00:26:15,090 --> 00:26:12,330
by Oh satellite was sent aloft to answer

218
00:26:17,430 --> 00:26:15,100
basic biological questions will cells

219
00:26:20,330 --> 00:26:17,440
divide normally while weightless

220
00:26:23,160 --> 00:26:20,340
how does zero-g affect plant growth

221
00:26:25,880 --> 00:26:23,170
would radiation and weightlessness be a

222
00:26:28,500 --> 00:26:25,890
hazard on long-duration spaceflights

223
00:26:31,260 --> 00:26:28,510
everything from plants to primates were

224
00:26:38,550 --> 00:26:31,270
orbited aboard by a satellite to find

225
00:26:40,770 --> 00:26:38,560
out there were the ogos orbiting

226
00:26:43,260 --> 00:26:40,780
geophysical observatories that blossomed

227
00:26:48,840 --> 00:26:43,270
out like giant dragonflies in space

228
00:26:51,180 --> 00:26:48,850
oh so orbiting solar observatories

229
00:26:56,049 --> 00:26:51,190
studied our Sun and its influence on

230
00:27:00,830 --> 00:26:59,270
in the last 25 years our orbiting

231
00:27:02,900 --> 00:27:00,840
astronomical observatories have

232
00:27:05,659 --> 00:27:02,910
radically changed our view of the

233
00:27:08,780 --> 00:27:05,669
universe we now see a dynamic universe

234
00:27:11,270 --> 00:27:08,790
of quasars and black holes and other

235
00:27:13,669 --> 00:27:11,280
extraordinary objects of cataclysmic

236
00:27:17,000 --> 00:27:13,679
forces causing the birth and death of

237
00:27:22,710 --> 00:27:17,010
stars of billions of galaxies wheeling

238
00:27:28,990 --> 00:27:26,080

we looked back at planet Earth with

239
00:27:31,840 --> 00:27:29,000
landsat remote sensing satellites crops

240
00:27:34,030 --> 00:27:31,850
forests pollution all can be

241
00:27:45,570 --> 00:27:34,040
photographed in great detail to help us

242
00:27:51,400 --> 00:27:48,430
the Viking program was a systematic

243
00:27:53,140 --> 00:27:51,410
effort to investigate the planet Mars to

244
00:27:55,540 --> 00:27:53,150
separately launched Viking spacecraft

245
00:27:57,370 --> 00:27:55,550
made up of a pair of orbiters that would

246
00:27:59,830 --> 00:27:57,380
photograph from above the planet and

247
00:28:03,190 --> 00:27:59,840
twin Landers built to descend to the

248
00:28:05,200 --> 00:28:03,200
Martian surface spent 11 months and 420

249
00:28:09,100 --> 00:28:05,210
million miles traveling to the

250
00:28:11,500 --> 00:28:09,110
mysterious red planet the Landers robot

251
00:28:13,360 --> 00:28:11,510
arm conducted chemical and biological

252
00:28:16,390 --> 00:28:13,370
tests on the soil in a search for

253
00:28:20,070 --> 00:28:16,400
life-forms Martian weather and seismic

254
00:28:22,650 --> 00:28:20,080
reports were also sent back routinely

255
00:28:29,500 --> 00:28:22,660
cameras began returning pictures

256
00:28:35,240 --> 00:28:32,090
color photographs showed a surface

257
00:28:40,070 --> 00:28:35,250
littered with rocks a fine dust red or

258
00:28:42,200 --> 00:28:40,080
yellow brown could be seen everywhere we

259
00:28:48,590 --> 00:28:42,210
even had a chance to view the two moons

260
00:28:50,630 --> 00:28:48,600
of Mars Phobos and Deimos Vikings

261
00:28:52,880 --> 00:28:50,640
complex Science and Technology were

262
00:29:00,230 --> 00:28:52,890
considered to be a triumph equal to the

263
00:29:02,840 --> 00:29:00,240

landings on the moon two unmanned

264
00:29:05,330 --> 00:29:02,850
Voyager spacecraft carried a record with

265
00:29:07,250 --> 00:29:05,340
the sights and sounds of Earth just in

266
00:29:11,570 --> 00:29:07,260
case they encounter a cosmic neighbor

267
00:29:13,430 --> 00:29:11,580
along the way their head of planetary

268
00:29:16,100 --> 00:29:13,440
journey was designed to take them past

269
00:29:18,290 --> 00:29:16,110
Jupiter and Saturn and eventually one

270
00:29:21,350 --> 00:29:18,300
Voyager was to pass close to Uranus and

271
00:29:23,390 --> 00:29:21,360
Neptune voyager sensors recorded

272
00:29:25,760 --> 00:29:23,400
Jupiter's intricate weather patterns and

273
00:29:28,430 --> 00:29:25,770
detected massive lightning bolts in its

274
00:29:30,380 --> 00:29:28,440
churning cloud tops it took 40 minutes

275
00:29:32,390 --> 00:29:30,390
for a signal from Voyager passing

276
00:29:33,500 --> 00:29:32,400
Jupiter to be received by mission

277
00:29:36,380 --> 00:29:33,510
controllers at the Jet Propulsion

278
00:29:40,880 --> 00:29:36,390
Laboratory so the spacecraft had to be

279
00:29:45,010 --> 00:29:40,890
essentially automatic Voyager also took

280
00:29:51,870 --> 00:29:45,020
a good look at Jupiter's largest moons

281
00:30:00,480 --> 00:29:56,890
Europa Ganymede the largest moon appears

282
00:30:16,370 --> 00:30:00,490
to be a mixture of rock and ice and

283
00:30:27,019 --> 00:30:19,260
the voyagers next assignment was to fly

284
00:30:31,980 --> 00:30:29,700
Saturn's vast ring system is made up of

285
00:30:34,620 --> 00:30:31,990
many small particles that orbit the huge

286
00:30:36,720 --> 00:30:34,630
planet in wave-like patterns its

287
00:30:39,269 --> 00:30:36,730
atmosphere is buffeted by a strong jet

288
00:30:41,730 --> 00:30:39,279

stream that blows eastward at 1,200

289
00:30:44,039 --> 00:30:41,740
miles per hour Voyager detected the

290
00:30:46,340 --> 00:30:44,049
hottest gases ever observed in the solar

291
00:30:57,030 --> 00:30:46,350
system up to a billion degrees

292
00:30:57,040 --> 00:31:05,910
you

293
00:31:10,650 --> 00:31:08,730
as of now two-thirds of the planets in

294
00:31:13,170 --> 00:31:10,660
our solar system have been explored and

295
00:31:15,030 --> 00:31:13,180
by the end of this decade we will have

296
00:31:23,490 --> 00:31:15,040
explored most of the rest including

297
00:31:26,490 --> 00:31:23,500
Uranus and Neptune through the years the

298
00:31:29,670 --> 00:31:26,500
single most constant in NASA has been is

299
00:31:32,310 --> 00:31:29,680
now and continues to be its aeronautical

300
00:31:34,290 --> 00:31:32,320
research it is a common thread that is

301
00:31:36,420 --> 00:31:34,300
woven throughout the agency it has

302
00:31:38,910 --> 00:31:36,430
influenced everything that flies both on

303
00:31:40,410 --> 00:31:38,920
earth and in space there is little doubt

304
00:31:47,970 --> 00:31:40,420
why this country has been the world

305
00:31:50,220 --> 00:31:47,980
leader in things aeronautical here are

306
00:31:57,680 --> 00:31:50,230
some of the goals of the program make

307
00:32:02,340 --> 00:31:59,670
systematic improvement of engine

308
00:32:04,200 --> 00:32:02,350
components reduce weight through use of

309
00:32:06,600 --> 00:32:04,210
light but very strong composite

310
00:32:09,160 --> 00:32:06,610
materials

311
00:32:11,650 --> 00:32:09,170
study problems associated with wake

312
00:32:13,570 --> 00:32:11,660
vortices tornado-like patterns of air

313
00:32:15,670 --> 00:32:13,580

that trail off behind jet aircraft

314
00:32:17,850 --> 00:32:15,680
causing problems for smaller planes

315
00:32:19,870 --> 00:32:17,860
following closely in their wake

316
00:32:22,300 --> 00:32:19,880
airplanes are America's leading

317
00:32:30,640 --> 00:32:22,310
industrial export thanks to NASA's

318
00:32:32,680 --> 00:32:30,650
research and development programs since

319
00:32:35,110 --> 00:32:32,690
there are some 200,000 general aviation

320
00:32:37,360 --> 00:32:35,120
aircraft in this country national

321
00:33:20,250 --> 00:32:37,370
research is also improving this class of

322
00:33:25,240 --> 00:33:22,840
the heart of the research is a unique

323
00:33:26,950 --> 00:33:25,250
refrigerated test panel capable of

324
00:33:29,620 --> 00:33:26,960
simulating the icing conditions an

325
00:33:31,450 --> 00:33:29,630
aircraft is likely to encounter want to

326
00:33:33,820 --> 00:33:31,460
test has been run newly developed

327
00:33:43,450 --> 00:33:33,830
computer codes are used to evaluate the

328
00:33:47,780 --> 00:33:45,590
during the early days of manned

329
00:33:50,390 --> 00:33:47,790
spaceflight consideration was given to

330
00:33:52,670 --> 00:33:50,400
using a Parowan to return astronauts and

331
00:33:54,890 --> 00:33:52,680
spacecraft to earth while this method

332
00:35:27,130 --> 00:33:54,900
was ultimately discarded it did produce

333
00:35:32,720 --> 00:35:30,920
and oblique wing crafts that reduce air

334
00:35:54,440 --> 00:35:32,730
drag by pivoting the wing at various

335
00:35:56,450 --> 00:35:54,450
angles to the plane's fuselage the

336
00:36:01,220 --> 00:35:56,460
expertise used to make airplane

337
00:36:03,710 --> 00:36:01,230
propellers better has also been applied

338
00:36:06,800 --> 00:36:03,720

to powerful wind turbine electric

339
00:36:27,349 --> 00:36:06,810
generators including some of the largest

340
00:36:31,920 --> 00:36:30,030
NASA's aeronautical research was the

341
00:36:34,440 --> 00:36:31,930
seed from which the space program would

342
00:36:36,390 --> 00:36:34,450
grow a prime example of this was the

343
00:36:39,359 --> 00:36:36,400
lifting body project that began in the

344
00:36:41,849 --> 00:36:39,369
early 60s the combination of Windtunnel

345
00:37:19,180 --> 00:36:41,859
tests and actual flights led to the

346
00:37:24,049 --> 00:37:22,069
when the design and Windtunnel work was

347
00:37:27,109 --> 00:37:24,059
completed a series of approach and

348
00:37:29,240 --> 00:37:27,119
landing tests were scheduled since the

349
00:37:31,279 --> 00:37:29,250
orbiter has no power for landing its

350
00:37:52,040 --> 00:37:31,289
ability to land easily without a wrong

351
00:37:56,190 --> 00:37:54,690
the enterprise's near private audience

352
00:38:04,230 --> 00:37:56,200
gave finally proof that the shuttle

353
00:38:08,680 --> 00:38:06,340
the years of research and development

354
00:38:11,170 --> 00:38:08,690
would now be put to the ultimate test

355
00:38:13,920 --> 00:38:11,180
the first flight into space of shuttle

356
00:38:16,210 --> 00:38:13,930
Columbia with astronauts at the controls

357
00:38:17,830 --> 00:38:16,220
there was an air of excitement as the

358
00:38:19,600 --> 00:38:17,840
brand new shuttle moved from its

359
00:38:21,430 --> 00:38:19,610
processing facility at the Kennedy Space

360
00:38:23,530 --> 00:38:21,440
Center to the Vehicle Assembly Building

361
00:38:25,300 --> 00:38:23,540
where it would be mated with rockets and

362
00:38:26,830 --> 00:38:25,310
fuel time and rolled out to the launch

363
00:38:28,960 --> 00:38:26,840

pad

364
00:38:31,570 --> 00:38:28,970
never before had a new spacecraft been

365
00:38:34,870 --> 00:38:31,580
flown this way previous Mercury Gemini

366
00:38:37,000 --> 00:38:34,880
and Apollo's were man rated in advance

367
00:38:38,770 --> 00:38:37,010
meaning that unmanned flights were flown

368
00:38:39,340 --> 00:38:38,780
before putting an astronaut crew on

369
00:38:41,650 --> 00:38:39,350
board

370
00:38:44,020 --> 00:38:41,660
despite nagging problems with engines

371
00:38:48,730 --> 00:38:44,030
and protective titles there was a quiet

372
00:38:50,380 --> 00:38:48,740
optimist long time space workers knew

373
00:38:52,180 --> 00:38:50,390
from past experience with a lunar

374
00:39:08,559 --> 00:38:52,190
landing program that design and

375
00:39:30,089 --> 00:39:12,130
thirty seconds if it goes into the

376
00:39:30,099 --> 00:40:29,960
seven six five

377
00:40:39,660 --> 00:40:32,790
Roger Columbia you got the normal cap

378
00:42:17,820 --> 00:40:39,670
cops back now oh if that thought about

379
00:42:49,000 --> 00:42:46,260
into space okay standby

380
00:42:57,680 --> 00:42:49,010
okay we see pan a on and we'd like you

381
00:43:23,520 --> 00:43:00,839
the second time the circle was completed

382
00:43:28,870 --> 00:43:26,440
when space shuttle 3 left the launch pad

383
00:43:31,060 --> 00:43:28,880
it carried an experiment prepared by 18

384
00:43:33,490 --> 00:43:31,070
year-old Todd Nelson of Rose Creek

385
00:43:35,590 --> 00:43:33,500
Minnesota an experiment to study the

386
00:43:37,870 --> 00:43:35,600
effects of weightlessness on insects in

387
00:43:39,910 --> 00:43:37,880
space it's called the shuttle Student

388
00:43:41,200 --> 00:43:39,920

Involvement project and includes NASA

389
00:43:43,750 --> 00:43:41,210
the National Science Teachers

390
00:43:45,610 --> 00:43:43,760
Association and Industry sponsors who

391
00:43:48,070 --> 00:43:45,620
helped transform winning proposals into

392
00:43:49,690 --> 00:43:48,080
flight experiments since this first

393
00:43:51,220 --> 00:43:49,700
flight young people in high schools

394
00:43:53,680 --> 00:43:51,230
around the country have developed and

395
00:43:55,900 --> 00:43:53,690
flown a variety of experiments ranging

396
00:44:01,000 --> 00:43:55,910
from medical projects to the study of

397
00:44:02,650 --> 00:44:01,010
zero-gravity on an ant colony they are

398
00:44:04,390 --> 00:44:02,660
setting an example for others who may be

399
00:44:06,130 --> 00:44:04,400
encouraged to pursue careers in science

400
00:44:07,570 --> 00:44:06,140
and engineering something that

401
00:44:18,370 --> 00:44:07,580
ultimately can be translated into

402
00:44:21,860 --> 00:44:18,380
technological leadership for the u.s. on

403
00:44:23,960 --> 00:44:21,870
its fourth and final test flight

404
00:44:26,480 --> 00:44:23,970
performance made it possible to certify

405
00:44:31,400 --> 00:44:26,490
the space transportation system a fully

406
00:44:33,560 --> 00:44:31,410
operational carrier as they landed on

407
00:44:45,209 --> 00:44:33,570
July 4th the crew was greeted by

408
00:44:50,440 --> 00:44:48,400
the first operational flight to

409
00:44:52,479 --> 00:44:50,450
commercial communication satellites were

410
00:44:54,880 --> 00:44:52,489
hauled into orbit one for satellite

411
00:44:57,309 --> 00:44:54,890
business systems and one for Telesat of

412
00:45:02,620 --> 00:44:57,319
Canada their deployment was a complete

413
00:45:07,059 --> 00:45:04,839

space shuttle six was the second

414
00:45:08,799 --> 00:45:07,069
operational mission and flight one for

415
00:45:11,890 --> 00:45:08,809
challenger this country's newest

416
00:45:16,690 --> 00:45:11,900
spacecraft after launching a 5,000 pound

417
00:45:19,059 --> 00:45:16,700
truck and mission specialist astronauts

418
00:45:21,400 --> 00:45:19,069
story Musgrave and Donna Pederson became

419
00:46:13,580 --> 00:45:21,410
the first Americans in nine years to

420
00:46:25,720 --> 00:46:16,970
quite a pair of communication satellites

421
00:46:30,849 --> 00:46:29,440
shuttles 1 & 2 were now operational with

422
00:46:31,660 --> 00:46:30,859
the addition of a third orbiter

423
00:46:33,910 --> 00:46:31,670
Discoverer

424
00:46:35,890 --> 00:46:33,920
to the fleet and with literally dozens

425
00:46:38,050 --> 00:46:35,900
of astronauts in training at any given

426
00:46:40,540 --> 00:46:38,060
time this new space transportation

427
00:46:48,460 --> 00:46:40,550
system would begin delivering in earnest

428
00:46:51,250 --> 00:46:48,470
and with increasing frequency opening a

429
00:46:53,170 --> 00:46:51,260
new era in science is Space Lab where

430
00:46:54,940 --> 00:46:53,180
scientists from around the world work

431
00:46:57,370 --> 00:46:54,950
together in a unique international

432
00:46:59,349 --> 00:46:57,380
research center aboard NASA's Space

433
00:47:01,840 --> 00:46:59,359
Shuttle built by the European Space

434
00:47:03,790 --> 00:47:01,850
Agency Space Lab is creating exciting

435
00:47:05,920 --> 00:47:03,800
new opportunities for research in all

436
00:47:10,700 --> 00:47:05,930
the sciences and is making routine

437
00:47:15,020 --> 00:47:13,040
looking farther ahead there's the space

438
00:47:19,400 --> 00:47:15,030

telescope that will expand our vision

439
00:47:21,020 --> 00:47:19,410
almost to the edge of the universe the

440
00:47:23,329 --> 00:47:21,030
shuttle gives the United States an

441
00:47:26,120 --> 00:47:23,339
unrivaled tool for the practical use of

442
00:47:28,190 --> 00:47:26,130
space historically the space program has

443
00:47:30,440 --> 00:47:28,200
proceeded in a building block fashion

444
00:47:32,630 --> 00:47:30,450
and toward that end nASA has begun

445
00:47:34,820 --> 00:47:32,640
looking at the next logical step a

446
00:47:38,420 --> 00:47:34,830
possible future space station a

447
00:47:39,890 --> 00:47:38,430
permanent presence in space the station

448
00:47:42,109 --> 00:47:39,900
would serve as a scientific and

449
00:47:44,030 --> 00:47:42,119
technological laboratory as well as an

450
00:47:46,460 --> 00:47:44,040
Operations base from which satellites

451
00:47:49,040 --> 00:47:46,470
could be serviced and large structures

452
00:47:51,290 --> 00:47:49,050
assembled one of the highest priorities

453
00:47:53,510 --> 00:47:51,300
is to develop a clear understanding of a

454
00:47:55,940 --> 00:47:53,520
station's proper role in the total space

455
00:47:58,040 --> 00:47:55,950
program so that if and when it is

456
00:47:59,780 --> 00:47:58,050
proposed for development the station

457
00:48:02,630 --> 00:47:59,790
will be a truly significant national

458
00:48:24,650 --> 00:48:02,640
asset one that would ensure continued

459
00:48:27,670 --> 00:48:24,660
American preeminence in space our

460
00:48:31,820 --> 00:48:27,680
freedom independence national well-being

461
00:48:36,349 --> 00:48:31,830
will be new achievements new discoveries

462
00:48:39,380 --> 00:48:36,359
and push new frontiers we must to the

463
00:48:43,280 --> 00:48:39,390

future by demonstrating the potential

464
00:48:46,520 --> 00:48:43,290
and establishing a more permanent in

465
00:48:53,810 --> 00:48:51,170
the 25th anniversary of NASA to a casual

466
00:48:56,930 --> 00:48:53,820
observer NASA is identified by launch

467
00:49:00,590 --> 00:48:56,940
vehicles and spacecraft and airplanes

468
00:49:02,750 --> 00:49:00,600
and wind tunnels but it is the people

469
00:49:05,990 --> 00:49:02,760
behind it all who are really important

470
00:49:09,170 --> 00:49:06,000
it's the people who think and dream and

471
00:49:11,210 --> 00:49:09,180
work to make these things possible that

472
00:49:14,210 --> 00:49:11,220
is the true measure of NASA's strengths

473
00:49:16,730 --> 00:49:14,220
and its successes and it is to the next

474
00:49:19,190 --> 00:49:16,740
generation of space pioneers the youth