
Discovery

1
00:00:23,930 --> 00:00:21,180
the 26th mission of the space shuttle

2
00:00:27,240 --> 00:00:23,940
the first after the Challenger accident

3
00:00:30,270 --> 00:00:27,250
what was our main objective a safe

4
00:00:33,360 --> 00:00:30,280
launch and a safe return we used that as

5
00:00:34,980 --> 00:00:33,370
the dominant theme of our crew patch the

6
00:00:37,020 --> 00:00:34,990
red vector from the NASA meatball

7
00:00:38,960 --> 00:00:37,030
indicates that we are still building

8
00:00:43,290 --> 00:00:38,970
upon the traditional strengths of NASA

9
00:00:45,710 --> 00:00:43,300
the seven star Big Dipper symbolized our

10
00:00:52,079 --> 00:00:45,720
seven friends lost on the Challenger the

11
00:00:55,110 --> 00:00:52,089
sunrise represented a new beginning on

12
00:00:57,000 --> 00:00:55,120
September 29th 1988 while we slept

13
00:01:00,360 --> 00:00:57,010

discovery was being fueled on the launch

14
00:01:02,700 --> 00:01:00,370
pad we got up at about 5:00 a.m. and

15
00:01:05,460 --> 00:01:02,710
after breakfast in our weather briefs we

16
00:01:07,920 --> 00:01:05,470
suited up I'm captain Rick out commander

17
00:01:11,610 --> 00:01:07,930
of the mission the pilot was Colonel

18
00:01:14,820 --> 00:01:11,620
dick Covey mission specialists

19
00:01:21,450 --> 00:01:14,830
Lieutenant Colonel Dave helmers dr.

20
00:01:22,890 --> 00:01:21,460
pinky Nelson and Mike lounge this flight

21
00:01:24,930 --> 00:01:22,900
was to be the culmination of the efforts

22
00:01:27,590 --> 00:01:24,940
of tens of thousands of people across

23
00:01:30,210 --> 00:01:27,600
the nation NASA engineers contractors

24
00:01:32,790 --> 00:01:30,220
many advisory groups both within and

25
00:01:35,910 --> 00:01:32,800
outside government this was to be in

26
00:01:36,990 --> 00:01:35,920
every sense a test flight during the 30

27
00:01:38,580 --> 00:01:37,000
months since the Challenger accident

28
00:01:40,530 --> 00:01:38,590
there had been hundreds of hardware

29
00:01:43,020 --> 00:01:40,540
changes to not only the solid rocket

30
00:01:46,260 --> 00:01:43,030
booster but also to the orbiter and the

31
00:01:47,940 --> 00:01:46,270
large liquid rocket fuel tank numerous

32
00:01:52,320 --> 00:01:47,950
software changes had been implemented

33
00:01:55,260 --> 00:01:52,330
all had been tested exhaustively we had

34
00:01:57,030 --> 00:01:55,270
trained as a crew for 20 months when it

35
00:01:59,340 --> 00:01:57,040
came time to strap into this four and a

36
00:02:01,110 --> 00:01:59,350
half million pounds of hardware we were

37
00:02:37,090 --> 00:02:01,120
convinced that the team was as ready as

38
00:02:42,290 --> 00:02:39,650

autosequence start discoveries for

39
00:02:44,509 --> 00:02:42,300
redundant computers have assumed t-minus

40
00:02:51,309 --> 00:02:44,519
23 seconds and counting

41
00:02:58,160 --> 00:02:51,319
the s are being the nozzle profiles - 15

42
00:02:58,640 --> 00:02:58,170
14 13 12 11 10 we're go for main engine

43
00:03:20,080 --> 00:02:58,650
start

44
00:03:26,839 --> 00:03:23,990
Humphry cleared the tower Roger roll

45
00:03:29,750 --> 00:03:26,849
discovery roll program Houston and

46
00:03:32,270 --> 00:03:29,760
controlling whether you have flown

47
00:03:33,920 --> 00:03:32,280
aboard the shuttle before or not you're

48
00:03:36,710 --> 00:03:33,930
never really quite ready for the launch

49
00:03:39,140 --> 00:03:36,720
experience emotions adrenaline sight

50
00:03:41,870 --> 00:03:39,150
sound and motion all well together in an

51
00:03:43,160 --> 00:03:41,880
overwhelming bond your body tells you

52
00:03:45,380 --> 00:03:43,170
that something very powerful is

53
00:03:47,839 --> 00:03:45,390
propelling you and leaves no doubt that

54
00:03:49,220 --> 00:03:47,849
you were going somewhere very fast as we

55
00:03:51,890 --> 00:03:49,230
pass through the region of maximum

56
00:04:05,300 --> 00:03:51,900
dynamic pressure ii seem to move ever so

57
00:04:07,580 --> 00:04:05,310
slowly the solid rocket motors worked

58
00:04:09,500 --> 00:04:07,590
superbly the long hard work of the

59
00:04:11,809 --> 00:04:09,510
redesign and test teams had paid off in

60
00:04:13,699 --> 00:04:11,819
a perfect launch those motors burned for

61
00:04:15,050 --> 00:04:13,709
two minutes but it takes another six and

62
00:04:17,659 --> 00:04:15,060
a half minutes to achieve orbital

63
00:04:19,250 --> 00:04:17,669

velocity the discoveries liquid fuel

64
00:04:21,140 --> 00:04:19,260
engines provided the additional push

65
00:04:23,330 --> 00:04:21,150
required to accelerate to a speed of

66
00:04:26,390 --> 00:04:23,340
five miles a second and an altitude of

67
00:04:28,850 --> 00:04:26,400
160 nautical miles in that orbit we

68
00:04:31,100 --> 00:04:28,860
would see 16 sunrises and sunsets a day

69
00:04:34,040 --> 00:04:31,110
for the next four days traveling over

70
00:04:37,129 --> 00:04:34,050
one and two thirds million miles engines

71
00:04:39,529 --> 00:04:37,139
still running 104 percent fifty six

72
00:04:41,390 --> 00:04:39,539
hundred feet per second velocity 31.8

73
00:04:45,920 --> 00:04:41,400
nautical miles altitude downrange

74
00:04:47,420 --> 00:04:45,930
distance thirty-eight nautical miles one

75
00:04:49,129 --> 00:04:47,430
of our primary objectives for this

76
00:04:51,110 --> 00:04:49,139
flight was to deploy a large

77
00:04:53,300 --> 00:04:51,120
communication satellite for NASA and

78
00:04:57,170 --> 00:04:53,310
once we got safely into orbit we got

79
00:04:59,240 --> 00:04:57,180
busy preparing for that deployment Rick

80
00:05:02,060 --> 00:04:59,250
and Vic up in the front seats of a

81
00:05:03,529 --> 00:05:02,070
flight deck got busy check-in the

82
00:05:06,020 --> 00:05:03,539
orbiter and making sure it was healthy

83
00:05:07,850 --> 00:05:06,030
and ready to do the required separation

84
00:05:11,510 --> 00:05:07,860
maneuver after the deployment of the

85
00:05:14,150 --> 00:05:11,520
TDRs satellite meanwhile Dave and I were

86
00:05:16,190 --> 00:05:14,160
busy on the aft flight deck checking the

87
00:05:18,279 --> 00:05:16,200
telemetry from the spacecraft and its

88
00:05:21,670 --> 00:05:18,289

booster making sure it was healthy and

89
00:05:23,889 --> 00:05:21,680
for deployment the satellite is a 5,000

90
00:05:25,659 --> 00:05:23,899
pound very complex communication

91
00:05:28,570 --> 00:05:25,669
satellite the dark object here in the

92
00:05:31,329 --> 00:05:28,580
picture it's carried to its 22,000 mile

93
00:05:33,909 --> 00:05:31,339
high orbit by the inertial upper stage

94
00:05:37,659 --> 00:05:33,919
which is the white portion of this

95
00:05:40,450 --> 00:05:37,669
40-foot stack and my job here was upon

96
00:05:42,159 --> 00:05:40,460
getting a go from Mission Control to

97
00:05:49,239 --> 00:05:42,169
throw a switch that would separate this

98
00:06:09,730 --> 00:05:49,249
stack from the support structure go

99
00:06:12,159 --> 00:06:09,740
procedures deploy here we see the

100
00:06:14,889 --> 00:06:12,169
tigress eye us.combination shortly after

101
00:06:17,079 --> 00:06:14,899
deployment at the moment of deployment

102
00:06:19,769 --> 00:06:17,089
push-off Springs gave it a slow and

103
00:06:22,239 --> 00:06:19,779
majestic separation from the shuttle

104
00:06:25,869 --> 00:06:22,249
pinky was our chief photo documentary

105
00:06:27,790 --> 00:06:25,879
for the deploy Rick came back to the app

106
00:06:30,549 --> 00:06:27,800
flight deck and maneuvered the orbiter

107
00:06:32,469 --> 00:06:30,559
about one minute after the deploy the

108
00:06:34,230 --> 00:06:32,479
maneuver that he made gave additional

109
00:06:36,699 --> 00:06:34,240
separation from the satellite and

110
00:06:44,649 --> 00:06:36,709
positioned it in the overhead window so

111
00:06:46,360 --> 00:06:44,659
it could be tracked visually about 60

112
00:06:48,369 --> 00:06:46,370
minutes after the deploy the first of

113
00:06:51,159 --> 00:06:48,379

two solid rocket motors fired on the

114
00:06:52,749 --> 00:06:51,169
upper stage these rockets placed the

115
00:06:55,659 --> 00:06:52,759
satellite in an orbit above the equator

116
00:06:58,570 --> 00:06:55,669
such will remain fixed relative to the

117
00:07:00,159 --> 00:06:58,580
ground it will be used by NASA to

118
00:07:02,199 --> 00:07:00,169
increase shuttle communications with

119
00:07:04,689 --> 00:07:02,209
Mission Control and will also be

120
00:07:07,659 --> 00:07:04,699
utilized by spacecraft such as Landsat

121
00:07:09,699 --> 00:07:07,669
to relay telemetry to the ground many

122
00:07:11,290 --> 00:07:09,709
other private and government agencies

123
00:07:16,359 --> 00:07:11,300
will be using this extremely

124
00:07:18,519 --> 00:07:16,369
sophisticated satellite until the United

125
00:07:20,290 --> 00:07:18,529
States Space Station is on orbit the

126
00:07:23,559 --> 00:07:20,300
mid-deck of the orbiter will be the free

127
00:07:25,600 --> 00:07:23,569
world's only microgravity laboratory the

128
00:07:27,480 --> 00:07:25,610
mid-deck is a national resource that was

129
00:07:30,759 --> 00:07:27,490
well used during the flight of discovery

130
00:07:32,340 --> 00:07:30,769
we carried 11 experiments on board from

131
00:07:36,580 --> 00:07:32,350
the Marshall Space Flight Center

132
00:07:39,010 --> 00:07:36,590
JSC industry and university laboratories

133
00:07:41,320 --> 00:07:39,020
all across the country ranging from

134
00:07:44,680 --> 00:07:41,330
biomedical investigations like protein

135
00:07:46,089 --> 00:07:44,690
crystal growth to material science to an

136
00:07:49,540 --> 00:07:46,099
engineering test of an infrared

137
00:07:51,040 --> 00:07:49,550
communication system to experiments

138
00:07:53,290 --> 00:07:51,050

designed by high school students were

139
00:07:55,870 --> 00:07:53,300
performed both for their scientific

140
00:07:57,820 --> 00:07:55,880
value and to encourage young people to

141
00:07:58,920 --> 00:07:57,830
develop interest in space science and

142
00:08:01,210 --> 00:07:58,930
spaceflight

143
00:08:04,600 --> 00:08:01,220
both of these experiments were very

144
00:08:06,400 --> 00:08:04,610
visual when heated titanium wires the

145
00:08:09,310 --> 00:08:06,410
other grew crystals of lead iodide on a

146
00:08:11,589 --> 00:08:09,320
membrane even on a short four day

147
00:08:14,920 --> 00:08:11,599
mission the scientific return from our

148
00:08:16,779 --> 00:08:14,930
experiments is significant another

149
00:08:19,659 --> 00:08:16,789
mid-deck experiment we performed was a

150
00:08:22,330 --> 00:08:19,669
phased partition experiment here we see

151
00:08:23,770 --> 00:08:22,340
pinky shaken up the experiment container

152
00:08:26,740 --> 00:08:23,780
while I was setting up the photo

153
00:08:28,689 --> 00:08:26,750
equipment first partitioning is one

154
00:08:31,510 --> 00:08:28,699
method currently used for separating

155
00:08:33,610 --> 00:08:31,520
different types of biological cells this

156
00:08:34,810 --> 00:08:33,620
process has been shown to be extremely

157
00:08:37,180 --> 00:08:34,820
valuable in developing new

158
00:08:40,659 --> 00:08:37,190
pharmaceuticals and also in performing

159
00:08:42,370 --> 00:08:40,669
biomedical research after we had shaken

160
00:08:44,170 --> 00:08:42,380
the experiment we photographed the

161
00:08:45,850 --> 00:08:44,180
chambers to study their D mixing

162
00:08:51,220 --> 00:08:45,860
properties which are not completely

163
00:08:51,639 --> 00:08:51,230

understood here on earth discovery

164
00:08:56,050 --> 00:08:51,649
Houston

165
00:08:58,060 --> 00:08:56,060
we're with you through Hawaii we'd like

166
00:08:59,470 --> 00:08:58,070
to take just a few moments today to

167
00:09:01,120 --> 00:08:59,480
share with you some of the sites that

168
00:09:04,389 --> 00:09:01,130
we've been privileged to view over the

169
00:09:06,340 --> 00:09:04,399
past several days as we watch along with

170
00:09:09,510 --> 00:09:06,350
you many emotions swell up in our hearts

171
00:09:11,949 --> 00:09:09,520
joy for America's return to space

172
00:09:14,530 --> 00:09:11,959
gratitude for an eighth support through

173
00:09:17,560 --> 00:09:14,540
difficult times Thanksgiving for the

174
00:09:20,910 --> 00:09:17,570
safety of our crew reverence for those

175
00:09:24,130 --> 00:09:20,920
who sacrifice made our journey possible

176
00:09:26,050 --> 00:09:24,140
gazing outside we can understand why

177
00:09:28,569 --> 00:09:26,060
mankind has looked towards the heavens

178
00:09:31,750 --> 00:09:28,579
with all and wonder since the dawn of

179
00:09:33,190 --> 00:09:31,760
human existence we can comprehend why

180
00:09:36,819 --> 00:09:33,200
our countrymen have been driven to

181
00:09:38,980 --> 00:09:36,829
explore the vast expanse of space and we

182
00:09:41,590 --> 00:09:38,990
are convinced that this is the road to

183
00:09:44,230 --> 00:09:41,600
the future the road that Americans must

184
00:09:45,690 --> 00:09:44,240
travel if we are to maintain the dream

185
00:09:48,550 --> 00:09:45,700
of our Constitution

186
00:09:53,920 --> 00:09:48,560
to secure the blessings of liberty to

187
00:09:56,530 --> 00:09:53,930
ourselves and our posterity as we occur

188
00:09:59,320 --> 00:09:56,540

discovery witness this earthly splendor

189
00:10:01,269 --> 00:09:59,330
from American spacecraft less than 200

190
00:10:04,570 --> 00:10:01,279
miles separates us from the remainder of

191
00:10:07,269 --> 00:10:04,580
mankind in a fraction of a second our

192
00:10:09,640 --> 00:10:07,279
words reach our ears but lest we ever

193
00:10:11,710 --> 00:10:09,650
forget that these few miles represent a

194
00:10:13,990 --> 00:10:11,720
great gulf that to the center this

195
00:10:16,420 --> 00:10:14,000
seemingly tranquil sea will always be

196
00:10:18,460 --> 00:10:16,430
fraught with danger let us remember the

197
00:10:21,010 --> 00:10:18,470
Challenger crew whose voyage was so

198
00:10:23,590 --> 00:10:21,020
tragically short with them we share the

199
00:10:27,070 --> 00:10:23,600
common purpose with them we shared a

200
00:10:28,750 --> 00:10:27,080
common goal at this moment our place in

201
00:10:31,150 --> 00:10:28,760
the heavens makes us feel closer to them

202
00:10:32,920 --> 00:10:31,160
than ever before those are the

203
00:10:35,260 --> 00:10:32,930
Challenger who had flown before us seen

204
00:10:37,360 --> 00:10:35,270
these sites they would know the meaning

205
00:10:39,790 --> 00:10:37,370
of our thoughts those who had gone to

206
00:10:41,890 --> 00:10:39,800
view them for the first time they would

207
00:10:45,780 --> 00:10:41,900
know why we searched forth they were

208
00:10:49,060 --> 00:10:45,790
fellow sojourners they were our friends

209
00:10:52,210 --> 00:10:49,070
today up here where the blue sky turns

210
00:10:56,290 --> 00:10:52,220
to black we can say at long last to dick

211
00:10:59,320 --> 00:10:56,300
Mike duty to Ron and now and the Kristin

212
00:11:01,510 --> 00:10:59,330
break dear friends we have resumed the

213
00:11:04,600 --> 00:11:01,520

journey that we promise to continue for

214
00:11:06,780 --> 00:11:04,610
you dear friends your loss has meant

215
00:11:10,090 --> 00:11:06,790
that we could confidently begin anew

216
00:11:14,470 --> 00:11:10,100
dear friends your spit and your dream I

217
00:11:16,180 --> 00:11:14,480
still alive in our heart a discovery on

218
00:11:17,280 --> 00:11:16,190
behalf of the Challenger families and

219
00:11:19,540 --> 00:11:17,290
all of us down here

220
00:11:21,880 --> 00:11:19,550
it sure does feel good to see the

221
00:11:38,769 --> 00:11:21,890
Challenger mission continue in America

222
00:11:57,809 --> 00:11:38,779
back in space time to stop doing that

223
00:11:57,819 --> 00:12:07,920
is the place to be

224
00:12:18,670 --> 00:12:10,360
just give her the gas and look at his

225
00:12:20,740 --> 00:12:18,680
baby oh are you awake yet why

226
00:14:45,800 --> 00:12:20,750
because it's time to eat breakfast from

227
00:14:50,250 --> 00:14:48,270
special control on NASA select

228
00:14:53,070 --> 00:14:50,260
television we're now taking a view from

229
00:14:56,390 --> 00:14:53,080
helicopter over the landing area we're

230
00:15:02,450 --> 00:14:56,400
looking at some of the 380,000 people

231
00:15:06,480 --> 00:15:05,220
discovery handled beautifully even

232
00:15:08,670 --> 00:15:06,490
though it's a two hundred thousand pound

233
00:15:15,720 --> 00:15:08,680
lighter it responds very well to control

234
00:15:17,610 --> 00:15:15,730
inputs we came subsonic overhead the

235
00:15:20,190 --> 00:15:17,620
Edwards Lake bed in about forty thousand

236
00:15:22,110 --> 00:15:20,200
feet and dick coming took control for

237
00:15:23,300 --> 00:15:22,120
about ten or 15 seconds and passed it to

238
00:15:26,400 --> 00:15:23,310

me

239
00:15:31,520 --> 00:15:26,410
discovery Houston on centerline on glide

240
00:15:37,860 --> 00:15:34,350
flew the glide slope in the standard

241
00:15:38,670 --> 00:15:37,870
orbiter approach about three hundred

242
00:15:40,620 --> 00:15:38,680
miles an hour

243
00:15:42,420 --> 00:15:40,630
pointed down at the lake bed our sink

244
00:15:44,400 --> 00:15:42,430
rates about eleven thousand feet per

245
00:15:47,640 --> 00:15:44,410
minute then as we get to eighteen

246
00:15:50,730 --> 00:15:47,650
hundred feet I pulled back gently on the

247
00:16:02,950 --> 00:15:50,740
stick both to shallow the descent rate

248
00:16:07,720 --> 00:16:05,350
and about 300 feet to come he lowered

249
00:16:23,139 --> 00:16:07,730
the landing gear their gear down and

250
00:16:32,510 --> 00:16:30,440
thank you touchdown man hurry up now

251
00:16:52,389 --> 00:16:32,520
rotating the nose down standing by for

252
00:17:03,370 --> 00:16:55,970
with only moderate breaking we stopped

253
00:17:09,340 --> 00:17:06,169
roger wheelstop discovery welcome back

254
00:17:11,860 --> 00:17:09,350
great ending to the new beginning I

255
00:17:14,390 --> 00:17:11,870
collapse

256
00:17:15,949 --> 00:17:14,400
after completing the post Landing checks

257
00:17:17,870 --> 00:17:15,959
we were met at the bottom of the steps

258
00:17:21,289 --> 00:17:17,880
by Vice President Bush NASA

259
00:17:22,909 --> 00:17:21,299
Administrator dr. Jim Fletcher and the

260
00:17:25,400 --> 00:17:22,919
head of the office of space flight Rear

261
00:17:27,409 --> 00:17:25,410
Admiral dick truly we knew that the

262
00:17:29,840 --> 00:17:27,419
smiles on their faces reflected the mood

263
00:17:32,299 --> 00:17:29,850

of the NASA team we'd accomplished the