



1
00:00:06,309 --> 00:00:05,190
ten seconds we have gold for main engine

2
00:00:07,110 --> 00:00:06,319
start

3
00:00:07,909 --> 00:00:07,120
seven

4
00:00:08,950 --> 00:00:07,919
six

5
00:00:10,070 --> 00:00:08,960
five

6
00:00:11,110 --> 00:00:10,080
four

7
00:00:12,150 --> 00:00:11,120
three

8
00:00:13,669 --> 00:00:12,160
two

9
00:00:15,589 --> 00:00:13,679
one

10
00:00:18,630 --> 00:00:15,599
booster ignition and liftoff of shuttle

11
00:00:20,070 --> 00:00:18,640
discovery kambate kudasai best of luck

12
00:00:25,750 --> 00:00:20,080
to the international space station's

13
00:00:29,109 --> 00:00:27,589

roger roll discovery

14

00:00:31,269 --> 00:00:29,119

houston now controlling the flight of

15

00:00:34,069 --> 00:00:31,279

discovery of man-made rising sun on

16

00:00:35,910 --> 00:00:34,079

behalf of japan

17

00:00:37,350 --> 00:00:35,920

discovery on the proper alignment heads

18

00:00:39,270 --> 00:00:37,360

down wings level for the eight and a

19

00:00:40,790 --> 00:00:39,280

half minute ride to orbit four and a

20

00:00:42,549 --> 00:00:40,800

half million pounds of hardware and

21

00:00:49,990 --> 00:00:42,559

humans taking aim on the international

22

00:00:53,750 --> 00:00:51,990

36 seconds into the flight the three

23

00:00:55,910 --> 00:00:53,760

liquid fuel main engines now throttling

24

00:00:57,750 --> 00:00:55,920

back to 72 percent of rated performance

25

00:01:07,109 --> 00:00:57,760

going in the bucket reducing the stress

26
00:01:10,710 --> 00:01:09,270
discovery already five miles in altitude

27
00:01:12,390 --> 00:01:10,720
eight and a half miles downrange

28
00:01:14,710 --> 00:01:12,400
traveling almost a thousand miles an

29
00:01:14,720 --> 00:01:22,149
discovery houston go at throttle up

30
00:01:25,030 --> 00:01:23,510
throttle up call acknowledged by

31
00:01:26,870 --> 00:01:25,040
commander mark kelly joined on the

32
00:01:28,230 --> 00:01:26,880
flight deck by pilot ken ham flight

33
00:01:30,550 --> 00:01:28,240
engineer ron garan and mission

34
00:01:32,710 --> 00:01:30,560
specialist karen nyberg down on the mid

35
00:01:35,030 --> 00:01:32,720
deck are mike fossum aki hoshide and

36
00:01:58,469 --> 00:01:35,040
greg shamatoff heading for a half year

37
00:02:04,709 --> 00:02:01,990
one minute 45 seconds into the flight

38
00:02:06,870 --> 00:02:04,719

discovery 22 miles in altitude 23 miles

39

00:02:22,630 --> 00:02:06,880

downrange standing by for solid rocket

40

00:02:31,190 --> 00:02:24,790

booster officer confirmed staging a good

41

00:02:35,750 --> 00:02:34,150

guidance now converging

42

00:02:37,350 --> 00:02:35,760

the onboard computer steering the

43

00:02:40,070 --> 00:02:37,360

shuttle for the on-ramp to the highway

44

00:02:42,790 --> 00:02:40,080

for the international space station

45

00:03:01,430 --> 00:02:42,800

discovery 37 miles in altitude 50 miles

46

00:03:04,949 --> 00:03:03,110

the orbital maneuvering system engines

47

00:03:06,630 --> 00:03:04,959

have ignited providing discovery with a

48

00:03:12,149 --> 00:03:06,640

burst of power for the next two minutes

49

00:03:16,229 --> 00:03:14,309

that call from mark kelly the first of a

50

00:03:18,229 --> 00:03:16,239

series of performance calls in the event

51
00:03:20,309 --> 00:03:18,239
of the loss of a main engine however all

52
00:03:22,390 --> 00:03:20,319
three main engines continue to perform

53
00:03:24,390 --> 00:03:22,400
normally along with the auxiliary power

54
00:03:26,070 --> 00:03:24,400
units and the three power producing fuel

55
00:03:27,990 --> 00:03:26,080
cells

56
00:03:29,509 --> 00:03:28,000
discovery flying on the singular power

57
00:03:31,350 --> 00:03:29,519
of its three liquid fuel main engines

58
00:03:34,390 --> 00:03:31,360
draining a half a ton of fuel per second

59
00:03:37,350 --> 00:03:34,400
from the large fuel tank

60
00:03:39,110 --> 00:03:37,360
discovery 52 miles in altitude 100 miles

61
00:03:42,229 --> 00:03:39,120
downrange three and a half minutes into

62
00:03:45,190 --> 00:03:43,830
we're coming up on the point of negative

63
00:03:46,630 --> 00:03:45,200

return

64

00:03:48,869 --> 00:03:46,640

where the shuttle would be too far

65

00:03:50,470 --> 00:03:48,879

downrange too high in altitude to return

66

00:03:52,470 --> 00:03:50,480

to the launch site in the event of an

67

00:03:54,149 --> 00:03:52,480

engine failure all three and main

68

00:03:59,670 --> 00:03:54,159

engines continue to function normally

69

00:04:03,990 --> 00:04:02,309

three minutes 47 seconds into the flight

70

00:04:05,270 --> 00:04:04,000

discovery flying straight and true

71

00:04:11,350 --> 00:04:05,280

speeding toward a date with the

72

00:04:11,360 --> 00:04:15,990

discovery houston negative return

73

00:04:23,030 --> 00:04:18,550

roger negative return

74

00:04:25,110 --> 00:04:23,040

all of discovery systems in great shape

75

00:04:27,749 --> 00:04:25,120

four minutes 15 seconds into the flight

76

00:04:31,110 --> 00:04:27,759

discovery 62 miles in altitude picking

77

00:04:35,030 --> 00:04:31,120

up speed 170 miles downrange traveling

78

00:04:38,469 --> 00:04:36,629

the environmental systems officer

79

00:04:41,350 --> 00:04:38,479

reports the activation of the flash

80

00:04:43,430 --> 00:04:41,360

evaporator system providing cooling for

81

00:04:45,189 --> 00:04:43,440

discoveries avionics and other systems

82

00:04:46,790 --> 00:04:45,199

until the time that the payload bay

83

00:04:48,790 --> 00:04:46,800

doors are open an hour and a half into

84

00:04:53,110 --> 00:04:48,800

the flight

85

00:04:57,430 --> 00:04:54,790

all the main engines write down the

86

00:04:59,270 --> 00:04:57,440

money in good shape good performance

87

00:05:00,310 --> 00:04:59,280

good auxiliary power units good fuel

88

00:05:02,870 --> 00:05:00,320

cells

89

00:05:05,990 --> 00:05:02,880

discovery traveling 6 000 miles an hour

90

00:05:12,469 --> 00:05:06,000

66 miles in altitude 230 miles downrange

91

00:05:32,150 --> 00:05:13,990

five minutes into the flight three and a

92

00:05:39,990 --> 00:05:33,909

very quiet here on the flight control

93

00:05:45,590 --> 00:05:42,870

discovery houston press to ato select

94

00:05:50,790 --> 00:05:48,870

roger press the ato will select distance

95

00:05:53,830 --> 00:05:50,800

that call acknowledged by uh commander

96

00:05:55,510 --> 00:05:53,840

mark kelly indicating that in the event

97

00:05:57,350 --> 00:05:55,520

of a loss of a main engine we could

98

00:05:59,110 --> 00:05:57,360

still make our abort to orbit targets

99

00:06:04,710 --> 00:05:59,120

however all three main engines continue

100

00:06:08,550 --> 00:06:06,950

the orbiter will soon begin to roll to a

101
00:06:10,309 --> 00:06:08,560
heads up position

102
00:06:13,350 --> 00:06:10,319
now beginning that roll to heads up the

103
00:06:15,670 --> 00:06:13,360
main engine is now swiveling

104
00:06:17,430 --> 00:06:15,680
the shuttle rolling

105
00:06:19,430 --> 00:06:17,440
to its position above the fuel tank

106
00:06:21,110 --> 00:06:19,440
gaining more favorable communication to

107
00:06:23,430 --> 00:06:21,120
the tracking and data relay satellite

108
00:06:25,590 --> 00:06:23,440
system as it heads up hill

109
00:06:28,070 --> 00:06:25,600
six minutes 15 seconds into the flight

110
00:06:31,029 --> 00:06:28,080
discovery traveling almost 10 000 miles

111
00:06:32,830 --> 00:06:31,039
an hour 397 miles downrange from the

112
00:06:35,990 --> 00:06:32,840
kennedy space center

113
00:06:40,469 --> 00:06:36,000

104 your shutdown plan is nominal and

114

00:06:44,070 --> 00:06:42,390

competent terry copy the boundary

115

00:06:47,110 --> 00:06:44,080

nominal shutdown plane

116

00:06:52,230 --> 00:06:47,120

go for the plus x go for the bench

117

00:06:55,990 --> 00:06:54,309

roger

118

00:06:57,749 --> 00:06:56,000

pressed a main engine cut off call by

119

00:06:59,430 --> 00:06:57,759

commander mark kelly indicating should

120

00:07:01,830 --> 00:06:59,440

we lose a main engine we can still make

121

00:07:03,670 --> 00:07:01,840

our nominal main engine cutoff targets

122

00:07:05,830 --> 00:07:03,680

however all three main engines hang in

123

00:07:07,510 --> 00:07:05,840

perfectly as well as the auxiliary power

124

00:07:09,830 --> 00:07:07,520

units and the fuel cells at the seven

125

00:07:12,390 --> 00:07:09,840

minute mark into the flight

126
00:07:14,469 --> 00:07:12,400
discovery now 515 miles downrange from

127
00:07:17,189 --> 00:07:14,479
the kennedy space center traveling 11

128
00:07:18,790 --> 00:07:17,199
000 miles an hour

129
00:07:20,150 --> 00:07:18,800
very soon the main engines will once

130
00:07:21,670 --> 00:07:20,160
again be throttled down to limit the

131
00:07:23,350 --> 00:07:21,680
stress on the shuttle and its seven crew

132
00:07:25,589 --> 00:07:23,360
members to that of three times the

133
00:07:28,469 --> 00:07:25,599
effect of gravity single engine press

134
00:07:33,830 --> 00:07:31,909
roger single engine pulse 104

135
00:07:35,270 --> 00:07:33,840
at the time of main engine cut off a

136
00:07:37,110 --> 00:07:35,280
little more than a minute from now

137
00:07:41,110 --> 00:07:37,120
discovery will enter its preliminary

138
00:07:43,510 --> 00:07:41,120

orbit at a speed of 5 miles a second

139

00:07:49,909 --> 00:07:43,520

discovery 615 miles downrange from the

140

00:07:54,629 --> 00:07:53,189

engines are now throttling back

141

00:07:56,790 --> 00:07:54,639

less than a minute of powered flight

142

00:07:59,749 --> 00:07:56,800

remaining for discovery

143

00:08:01,670 --> 00:07:59,759

traveling 14 000 miles an hour

144

00:08:13,909 --> 00:08:01,680

almost 700 miles downrange from the

145

00:08:17,430 --> 00:08:15,749

discovery passing twenty three thousand

146

00:08:18,629 --> 00:08:17,440

feet per second at the eight minute mark

147

00:08:29,270 --> 00:08:18,639

into the flight

148

00:08:33,029 --> 00:08:31,430

standing by for main engine cutoff that

149

00:08:48,070 --> 00:08:33,039

will be followed a few seconds later by

150

00:08:51,509 --> 00:08:49,750

booster officer confirms main engine

151

00:09:07,990 --> 00:08:51,519

cutoff standing by for external tank

152

00:09:13,430 --> 00:09:09,990

external tank separation confirmed

153

00:09:15,030 --> 00:09:13,440

discovery now in its preliminary orbit

154

00:09:16,949 --> 00:09:15,040

the centerpiece of japanese space

155

00:09:18,630 --> 00:09:16,959

science kibo completing the first leg of