1
00:00:29,779 --> 00:00:25,909
three-two-one t-minus five minutes and

2
00:00:32,330 --> 00:00:29,789
Counting we have a go for the orbiter

3
00:00:33,889 --> 00:00:32,340
APU start pilot llaha is now flipping

4
00:00:37,759 --> 00:00:33,899
the three switches in the cockpit to

5
00:00:40,479 --> 00:00:37,769
start each of the three ap use APU

6
00:00:42,890 --> 00:00:40,489
activation is complete

7
00:00:44,509 --> 00:00:42,900
Mandor Fred Gregory has been asked to

8
00:00:48,220 --> 00:00:44,519
reconfigure the orbiter heaters for

9
00:00:55,959 --> 00:00:48,230
launch he reports that those heaters are

10
00:00:59,590 --> 00:00:59,200
t-minus four minutes 27 seconds and

11
00:01:01,630 --> 00:00:59,600
counting

12
00:01:03,130 --> 00:01:01,640
the solid rocket booster and external

13
00:01:07,480 --> 00:01:03,140

tanks safe and armed devices had been

14
00:01:08,980 --> 00:01:07,490
armed with one oxygen replenishing of

15
00:01:14,770 --> 00:01:08,990
the external tank now has been

16
00:01:20,430 --> 00:01:14,780
terminated report now that the APU start

17
00:01:24,100 --> 00:01:20,440
is complete coming up now on t-minus

18
00:01:26,109 --> 00:01:24,110
four minutes main engine final purge

19
00:01:30,999 --> 00:01:26,119
sequence is underway the main engine

20
00:01:32,529 --> 00:01:31,009
valves are being checked the orbiter

21
00:01:34,389 --> 00:01:32,539
flight control surfaces such as the

22
00:01:35,620 --> 00:01:34,399
elevon speed brakes and rudder are now

23
00:01:37,419 --> 00:01:35,630
being moved through a pre-programmed

24
00:01:41,859 --> 00:01:37,429
pattern to verify that they are ready

25
00:01:42,660 --> 00:01:41,869
for launch t-minus 3 minutes 45 seconds

26
00:01:46,210 --> 00:01:42,670
and counting

27
00:01:51,179 --> 00:01:46,220
all systems on board the space shuttle

28
00:01:55,080 --> 00:01:53,669
coming up now on t-minus three minutes

29
00:01:57,120 --> 00:01:55,090
30 seconds and counting

30
00:01:58,980 --> 00:01:57,130
all three of Discovery's main engines

31
00:02:01,080 --> 00:01:58,990
are now being gimballed which is a

32
00:02:03,389 --> 00:02:01,090
steering check to verify the readiness

33
00:02:04,980 --> 00:02:03,399
for flight control when this check is

34
00:02:11,130 --> 00:02:04,990
complete they'll be aligned to their

35
00:02:14,699 --> 00:02:11,140
main engine start positions coming up

36
00:02:23,260 --> 00:02:14,709
now on the 3-minute mark in the count t

37
00:02:28,870 --> 00:02:27,190
t-minus three minutes t-minus 255 the

38
00:02:32,860 --> 00:02:28,880

pressurization of the liquid oxygen tank

39
00:02:35,940 --> 00:02:32,870
will begin and the gaseous nitrogen of

40
00:02:38,200 --> 00:02:35,950
the main engines will be terminated

41
00:02:40,600 --> 00:02:38,210
ground launch sequencer has started a

42
00:02:42,520 --> 00:02:40,610
retract of the gaseous oxygen pit hood

43
00:02:44,410 --> 00:02:42,530
which is the beanie cap on the external

44
00:02:46,180 --> 00:02:44,420
tank the computers will make a final

45
00:02:50,770 --> 00:02:46,190
check to ensure that the vent arm is

46
00:03:01,339 --> 00:02:50,780
fully retracted at the t-minus 37 second

47
00:03:05,270 --> 00:03:03,649
ground supply of hydrogen and oxygen for

48
00:03:07,369 --> 00:03:05,280
the orbiter fuel cells has now been

49
00:03:10,640 --> 00:03:07,379
turned off discovery is running on its

50
00:03:15,050 --> 00:03:10,650
onboard reactants the orbiter test

51
00:03:15,589 --> 00:03:15,060
conductor will shortly be asking John

52
00:03:19,960 --> 00:03:15,599
Blaha

53
00:03:24,830 --> 00:03:23,089
the crew has been told to close their

54
00:03:26,839 --> 00:03:24,840
visors on their launch and reentry

55
00:03:34,430 --> 00:03:26,849
helmets and to start the oxygen supply

56
00:03:36,559 --> 00:03:34,440
to their pressure suits we are go now

57
00:03:38,149 --> 00:03:36,569
for liquid hydrogen pressurization

58
00:03:40,580 --> 00:03:38,159
replenishing of the external tank is

59
00:03:43,039 --> 00:03:40,590
stopped tank being pressurized to flight

60
00:03:45,470 --> 00:03:43,049
level the space shuttle is now isolated

61
00:03:54,490 --> 00:03:45,480
from all ground propellant and fluid

62
00:03:58,630 --> 00:03:57,250
t-minus 90 seconds were less than a

63
00:04:00,430 --> 00:03:58,640

minute and a half away from the launch

64
00:04:01,300 --> 00:04:00,440
of STS 33 and the space shuttle

65
00:04:03,940 --> 00:04:01,310
Discovery

66
00:04:06,460 --> 00:04:03,950
with its five astronaut crew at t-minus

67
00:04:08,440 --> 00:04:06,470
one minute the ground law sequencer will

68
00:04:10,320 --> 00:04:08,450
verify that the shuttle main engines are

69
00:04:13,120 --> 00:04:10,330
ready to start

70
00:04:24,050 --> 00:04:13,130
like what hydrogen tank is now at flight

71
00:04:28,670 --> 00:04:26,330
t-minus one minute the sound suppression

72
00:04:30,980 --> 00:04:28,680
water system is now armed the water will

73
00:04:32,659 --> 00:04:30,990
be released at t minus 16 seconds at a

74
00:04:34,790 --> 00:04:32,669
flow rate of nine hundred thousand

75
00:04:36,650 --> 00:04:34,800
gallons per minute the heaters around

76
00:04:39,440 --> 00:04:36,660
the solid rocket booster joints have now

77
00:04:40,940 --> 00:04:39,450
been turned off hydrogen burning

78
00:04:42,710 --> 00:04:40,950
nighters have now been armed the

79
00:04:44,659 --> 00:04:42,720
igniters will be fired at t minus ten

80
00:04:47,960 --> 00:04:44,669
seconds to burn off any ambient hydrogen

81
00:04:49,370 --> 00:04:47,970
under the main engine nozzles solid

82
00:04:51,290 --> 00:04:49,380
rocket booster flight instrumentation

83
00:04:53,540 --> 00:04:51,300
recorders have now gone into the record

84
00:04:55,430 --> 00:04:53,550
mode the main propulsion system oxygen

85
00:04:59,840 --> 00:04:55,440
and hydrogen fill valves have now been

86
00:05:01,150 --> 00:04:59,850
closed t-minus 27 seconds we have a go

87
00:05:04,430 --> 00:05:01,160
for autosequence start

88
00:05:06,260 --> 00:05:04,440

t-minus 23 seconds and counting the

89
00:05:08,930 --> 00:05:06,270
orbiters body flap and speed break have

90
00:05:11,120 --> 00:05:08,940
been positioned for the launch t-minus

91
00:05:12,860 --> 00:05:11,130
15 seconds and counting

92
00:05:14,659 --> 00:05:12,870
sound suppression water system has

93
00:05:24,190 --> 00:05:14,669
started the launch igniters and

94
00:05:26,510 --> 00:05:24,200
pyrotechnics are armed 9 8 7 6 5 4 3 2 1

95
00:05:38,250 --> 00:05:26,520
liftoff

96
00:06:00,370 --> 00:05:56,590
roll program initiated three engines

97
00:06:01,660 --> 00:06:00,380
throttling back now to 65% as Discovery

98
00:06:07,360 --> 00:06:01,670
passes through the area of maximum

99
00:06:21,090 --> 00:06:07,370
dynamic pressure velocity now 2,000 feet

100
00:06:32,670 --> 00:06:21,100
per second if you use all looking good

101
00:06:37,089 --> 00:06:35,170
all three engines have now throttled

102
00:06:39,040 --> 00:06:37,099
back up to 104 percent the crews

103
00:06:58,900 --> 00:06:39,050
received a go at throttle a call meaning

104
00:07:04,790 --> 00:07:02,180
discovery now at velocity of 4000 feet

105
00:07:06,910 --> 00:07:04,800
per second three engines running at 104

106
00:07:43,030 --> 00:07:06,920
percent all three apu looking good

107
00:07:46,970 --> 00:07:45,320
separation of the solid rocket boosters

108
00:07:51,350 --> 00:07:46,980
has been been confirmed by the booster

109
00:07:53,480 --> 00:07:51,360
officer velocity now 5000 feet per

110
00:08:08,510 --> 00:07:53,490
second discovery 40 nautical miles

111
00:08:13,830 --> 00:08:11,010
flight dynamics officer has confirmed

112
00:08:15,210 --> 00:08:13,840
nominal performance from the combination

113
00:08:17,250 --> 00:08:15,220

of the engines and the solid rocket

114
00:08:19,050 --> 00:08:17,260
boosters this call means that we have

115
00:08:22,040 --> 00:08:19,060
gotten the expected thrust for the

116
00:08:25,320 --> 00:08:22,050
vehicle out of the booster system

117
00:08:28,410 --> 00:08:25,330
discovery now at 5,200 feet per second

118
00:08:40,320 --> 00:08:28,420
velocity altitude of 45 nautical miles

119
00:08:44,829 --> 00:08:43,089
discovery now has the capability to

120
00:08:47,500 --> 00:08:44,839
reach the transatlantic abort site

121
00:08:49,360 --> 00:08:47,510
should one engine fail three engines

122
00:08:52,570 --> 00:08:49,370
still looking good if you use all

123
00:09:38,310 --> 00:08:52,580
performing well velocity now 6000 feet

124
00:09:43,900 --> 00:09:40,540
discovery now moving at a velocity of

125
00:09:46,210 --> 00:09:43,910
7500 feet per second downrange 145

126
00:09:49,030 --> 00:09:46,220
nautical miles at an altitude of 54

127
00:09:51,970 --> 00:09:49,040
nautical miles all engines looking good

128
00:09:54,310 --> 00:09:51,980
and discovery has received the negative

129
00:09:56,290 --> 00:09:54,320
return call meaning that it is no longer

130
00:10:58,279 --> 00:09:56,300
no longer possible for discovery to

131
00:11:03,389 --> 00:11:00,569
discovery now visible through the

132
00:11:06,389 --> 00:11:03,399
television cameras on location at Dryden

133
00:11:09,269 --> 00:11:06,399
Flight Research Facility at Edwards Air

134
00:11:12,599 --> 00:11:09,279
Force Base in California Discovery's

135
00:12:17,139 --> 00:11:12,609
velocity now Mach 1.7 at 72 thousand

136
00:12:21,110 --> 00:12:19,519
flight dynamics officer reports

137
00:12:22,400 --> 00:12:21,120
discovery is looking good

138
00:12:35,740 --> 00:12:22,410

coming up on the heading alignment

139
00:12:39,830 --> 00:12:37,850
discovery will make a right overhead

140
00:13:03,310 --> 00:12:39,840
turn on the heading alignment circle of

141
00:13:07,879 --> 00:13:06,319
why dynamics officer reports discovery

142
00:13:13,730 --> 00:13:07,889
looking good rolling onto the heading

143
00:13:53,800 --> 00:13:13,740
alignment circle velocity 800 feet per

144
00:13:59,630 --> 00:13:56,329
guidance navigation and control officer

145
00:14:01,340 --> 00:13:59,640
reports nav is good discovery coming

146
00:14:05,210 --> 00:14:01,350
around the hitting alignment circle now

147
00:14:05,900 --> 00:14:05,220
about halfway around velocity 600 feet

148
00:14:51,190 --> 00:14:05,910
per second

149
00:14:55,340 --> 00:14:53,690
discovery looks good rolling onto final

150
00:15:01,730 --> 00:14:55,350
as reported by the flight dynamics

151
00:15:05,330 --> 00:15:01,740
officer surface winds are reported to be

152
00:15:07,400 --> 00:15:05,340
19 not head win and a four not right

153
00:15:18,550 --> 00:15:07,410
crosswind well within the limits for

154
00:15:57,699 --> 00:15:23,870
altitude is now 13,000 feet about one

155
00:16:02,300 --> 00:16:00,590
altitude now 6000 feet fly dynamics

156
00:16:04,429 --> 00:16:02,310
officer reports that discovery is

157
00:16:44,060 --> 00:16:04,439
converging on the center line above

158
00:16:44,070 --> 00:16:52,950
gear down and locked

159
00:16:52,960 --> 00:17:00,880
main gear touchdown

160
00:17:07,150 --> 00:17:04,329
nose gear touchdown discovery rolling