1
00:00:07,349 --> 00:00:04,630
two minutes 20 seconds away from launch

2
00:00:09,350 --> 00:00:07,359
the crew on board reporting in good

3
00:00:11,110 --> 00:00:09,360
health ready to go all the systems

4
00:00:13,110 --> 00:00:11,120
checking out

5
00:00:16,710 --> 00:00:13,120
the soyuz standing there on the pad

6
00:00:19,429 --> 00:00:16,720
where just 55 years ago in about a month

7
00:00:21,750 --> 00:00:19,439
yuri gagarin kicked off the age of human

8
00:00:23,670 --> 00:00:21,760
space flight jeff williams alexiochine

9
00:00:25,429 --> 00:00:23,680
and alex krapochka ready to keep it

10
00:00:47,190 --> 00:00:25,439
moving forward

11
00:00:50,950 --> 00:00:48,950
you'll see the final two umbilical

12
00:00:53,350 --> 00:00:50,960
towers attached to the vehicle um

13
00:00:56,790 --> 00:00:53,360

detached the first one separating about

14
00:00:57,750 --> 00:00:56,800
t minus 35 seconds then the final one uh

15
00:01:01,510 --> 00:00:57,760
detect

16
00:01:03,189 --> 00:01:01,520
retracting at about t minus 15 seconds

17
00:01:05,429 --> 00:01:03,199
and again the soyuz engines will fire

18
00:01:08,070 --> 00:01:05,439
for several seconds until the thrust of

19
00:01:10,630 --> 00:01:08,080
the rocket is able to overpower

20
00:01:13,109 --> 00:01:10,640
the force of the um holding arms keeping

21
00:01:14,950 --> 00:01:13,119
the rocket in place very simple but a

22
00:01:18,390 --> 00:01:14,960
very elegant way of keeping the rocket

23
00:01:18,400 --> 00:01:38,149
one minute and counting

24
00:01:38,159 --> 00:01:41,910
vehicle to internal power

25
00:01:41,920 --> 00:01:46,550
the vehicle now on internal power

26
00:01:51,030 --> 00:01:48,870
like you won everything there goes the

27
00:01:52,950 --> 00:01:51,040
first umbilical tower marking just about

28
00:01:55,190 --> 00:01:52,960
t minus 35

29
00:02:08,630 --> 00:01:55,200
should be under 30 seconds away from

30
00:02:13,350 --> 00:02:10,949
auto sequence initiated

31
00:02:16,070 --> 00:02:13,360
command issues for ignition

32
00:02:19,030 --> 00:02:16,080
second arm retracting launch command

33
00:02:21,990 --> 00:02:19,040
issued you can see the engines firing

34
00:02:24,550 --> 00:02:22,000
ramping up

35
00:02:25,990 --> 00:02:24,560
of maximum thrust the turbo pumps are at

36
00:02:29,589 --> 00:02:26,000
flight speed

37
00:02:35,030 --> 00:02:32,470
and liftoff jeff williams alexia opting

38
00:02:45,670 --> 00:02:35,040

and oleg skripochka launching to the

39
00:02:51,110 --> 00:02:47,430
the first stage of the

40
00:02:53,030 --> 00:02:51,120
soyuz booster delivering 930 000 pounds

41
00:02:58,309 --> 00:02:53,040
of thrust from the four strap-on

42
00:03:01,670 --> 00:02:59,750
first stage going to be burning liquid

43
00:03:03,589 --> 00:03:01,680
fuel for the first two minutes and six

44
00:03:09,190 --> 00:03:03,599
seconds into the flight

45
00:03:14,470 --> 00:03:11,030
let's see the crew on board again

46
00:03:16,790 --> 00:03:14,480
alexiochine in there in the center seat

47
00:03:18,630 --> 00:03:16,800
getting good reports of first stage

48
00:03:26,229 --> 00:03:18,640
functioning throughout the launch so far

49
00:03:30,869 --> 00:03:28,869
60 seconds in power slide your pitch and

50
00:03:33,350 --> 00:03:30,879
roll are nominal

51
00:03:35,350 --> 00:03:33,360
everything not on board musk

52
00:03:37,430 --> 00:03:35,360
so as we approach one minute and 10

53
00:03:40,149 --> 00:03:37,440
seconds into the flight the velocity of

54
00:03:49,910 --> 00:03:40,159
the vehicle already at about 1100 miles

55
00:03:54,309 --> 00:03:51,910
again everything continuing to go well

56
00:03:55,830 --> 00:03:54,319
with the ascent lasting just under nine

57
00:03:57,190 --> 00:03:55,840
minutes until these three crew members

58
00:03:59,190 --> 00:03:57,200
will be in space

59
00:04:00,470 --> 00:03:59,200
you'll see that owl

60
00:04:02,390 --> 00:04:00,480
begin to

61
00:04:04,789 --> 00:04:02,400
float in the microgravity environment an

62
00:04:07,350 --> 00:04:04,799
indicator of once they've reached their

63
00:04:09,830 --> 00:04:07,360

final altitude on board

64
00:04:13,589 --> 00:04:09,840
and the crew is feeling well

65
00:04:22,150 --> 00:04:15,110
and then in just a few seconds the

66
00:04:25,749 --> 00:04:23,749
and the visiting vehicle officer here in

67
00:04:27,830 --> 00:04:25,759
houston confirming the escape tower has

68
00:04:29,590 --> 00:04:27,840
been jettisoned and those four strap-on

69
00:04:31,830 --> 00:04:29,600
boosters have also been jettisoned

70
00:04:34,469 --> 00:04:31,840
they've completed their job and will now

71
00:04:37,430 --> 00:04:34,479
drop away soyuz already in an altitude

72
00:04:39,790 --> 00:04:37,440
of 28 statute miles cruising along in

73
00:04:45,070 --> 00:04:39,800
the at a speed of about 3

74
00:04:51,749 --> 00:04:48,790
140 seconds in the powered flight the

75
00:04:53,749 --> 00:04:51,759
structure is nominal

76
00:04:59,189 --> 00:04:53,759
everything is fine on board

77
00:05:00,710 --> 00:04:59,199
we are feeling fine zero zero 29 38

78
00:05:03,670 --> 00:05:00,720
we selected

79
00:05:06,150 --> 00:05:03,680
inaudible affirmative

80
00:05:08,230 --> 00:05:06,160
and so the second stage now firing the

81
00:05:11,430 --> 00:05:08,240
core booster continuing to push the

82
00:05:15,990 --> 00:05:13,270
and then getting confirmation now the

83
00:05:18,550 --> 00:05:16,000
launch shroud has been jettisoned so the

84
00:05:20,550 --> 00:05:18,560
soyuz spacecraft itself now exposed the

85
00:05:26,710 --> 00:05:20,560
rocket already in an altitude of about

86
00:05:29,990 --> 00:05:28,390
and just a little over three minutes

87
00:05:32,629 --> 00:05:30,000
into the flight so used to already

88
00:05:34,790 --> 00:05:32,639

traveling at a speed of about 4 700

89
00:05:36,790 --> 00:05:34,800
miles per hour there we can see nasa

90
00:05:39,029 --> 00:05:36,800
astronaut jeff williams this his third

91
00:05:40,950 --> 00:05:39,039
ride on the soyuz spacecraft getting

92
00:05:42,870 --> 00:05:40,960
ready for his fourth flight into space's

93
00:05:47,749 --> 00:05:42,880
third long duration mission on board the

94
00:05:51,510 --> 00:05:49,749
engines of the second stage

95
00:05:53,749 --> 00:05:51,520
the second stage continuing to perform

96
00:05:56,629 --> 00:05:53,759
as expected the core stage of the soyuz

97
00:05:58,550 --> 00:05:56,639
rocket measures 56 feet in length 13 and

98
00:06:00,870 --> 00:05:58,560
a half feet in diameter with a single

99
00:06:04,309 --> 00:06:00,880
engine with four fuel chambers providing

100
00:06:06,070 --> 00:06:04,319
between 178 thousand and 222 thousand

101
00:06:08,469 --> 00:06:06,080
pounds of thrust depending on the

102
00:06:11,510 --> 00:06:08,479
altitude of the rocket for its three

103
00:06:14,150 --> 00:06:11,520
minutes and 28 seconds of operation

104
00:06:16,710 --> 00:06:14,160
it's going to continue burning for about

105
00:06:19,670 --> 00:06:16,720
another 45 seconds or so until the 4

106
00:06:21,990 --> 00:06:19,680
minute 43 second mark and soyuz will use

107
00:06:23,590 --> 00:06:22,000
what's known as a hot stage technique

108
00:06:25,590 --> 00:06:23,600
the third stage will actually ignite

109
00:06:27,909 --> 00:06:25,600
while the second's still burning that's

110
00:06:33,510 --> 00:06:27,919
why the soyuz has that open area between

111
00:06:37,430 --> 00:06:35,590
the crew is doing well

112
00:06:39,350 --> 00:06:37,440
zero zero

113
00:06:42,070 --> 00:06:39,360

two two three

114
00:06:48,950 --> 00:06:42,080
thirty eight

115
00:06:52,710 --> 00:06:50,950
and all reports coming from

116
00:06:58,230 --> 00:06:52,720
russian flight controllers indicating

117
00:07:10,629 --> 00:06:59,670
and now we're going to be standing by

118
00:07:15,110 --> 00:07:13,189
and getting confirmation of second stage

119
00:07:17,589 --> 00:07:15,120
separation a bit of a jolt there the

120
00:07:20,309 --> 00:07:17,599
third stage now propelling the vehicle

121
00:07:23,350 --> 00:07:20,319
with a single engine this engine

122
00:07:25,589 --> 00:07:23,360
provides about 67 000 pounds of thrust

123
00:07:30,629 --> 00:07:25,599
it's going to burn for four minutes and

124
00:07:38,790 --> 00:07:34,629
romeo 11 is selected copy

125
00:07:43,270 --> 00:07:41,270
so already over five minutes into the

126
00:07:54,070 --> 00:07:43,280
flight the soyuz already in an altitude

127
00:08:10,550 --> 00:07:56,230
the crew is doing well

128
00:08:14,469 --> 00:08:12,710
again this third stage the final stage

129
00:08:16,469 --> 00:08:14,479
of the soyuz and it's climbed to orbit

130
00:08:19,909 --> 00:08:16,479
is going to fire until about eight

131
00:08:22,469 --> 00:08:19,919
minutes 45 seconds post liftoff so

132
00:08:23,589 --> 00:08:22,479
about another two and three quarters of

133
00:08:25,029 --> 00:08:23,599
a minute

134
00:08:27,350 --> 00:08:25,039
until the third stage is going to be

135
00:08:28,150 --> 00:08:27,360
done with its job and then at that point

136
00:08:29,909 --> 00:08:28,160
the

137
00:08:37,350 --> 00:08:29,919
liquid single liquid fueled engine will

138
00:08:41,670 --> 00:08:39,589

again everything all the calls coming in

139
00:08:43,909 --> 00:08:41,680
the vehicle performing as expected not

140
00:08:45,269 --> 00:08:43,919
tracking any issues on the crew on board

141
00:08:54,550 --> 00:08:45,279
in good health and making their way

142
00:08:59,110 --> 00:08:56,470
and also again once the third stage

143
00:09:00,630 --> 00:08:59,120
delivers the soyuz to orbit the module

144
00:09:02,550 --> 00:09:00,640
separates away a series of

145
00:09:05,350 --> 00:09:02,560
pre-programmed commands will spring into

146
00:09:06,870 --> 00:09:05,360
action in order to prepare the soyuz for

147
00:09:08,630 --> 00:09:06,880
orbital operations

148
00:09:11,190 --> 00:09:08,640
that includes uh

149
00:09:13,509 --> 00:09:11,200
deploying the antennas and activating a

150
00:09:17,990 --> 00:09:13,519
number of computer commands to activate

151
00:09:22,790 --> 00:09:21,110
we are expecting separation

152
00:09:25,430 --> 00:09:22,800
and the crew is doing well thank you and

153
00:09:28,470 --> 00:09:25,440
we're just about seven minutes now post

154
00:09:43,910 --> 00:09:28,480
launch so another minute 45 seconds for

155
00:09:48,550 --> 00:09:46,230
at this point the vehicle approaching

156
00:10:13,910 --> 00:09:48,560
speeds of about 13

157
00:10:13,920 --> 00:10:43,590
copy

158
00:10:43,600 --> 00:10:47,350
flight

159
00:10:51,829 --> 00:10:50,069
so just about 25 seconds away from that

160
00:10:53,590 --> 00:10:51,839
third stage cut off and separation you

161
00:10:55,430 --> 00:10:53,600
can see the crew onboard the so you're

162
00:10:58,389 --> 00:10:55,440
still doing well keep your eye on that

163
00:11:00,949 --> 00:10:58,399

owl should start floating uh in just a

164
00:11:10,630 --> 00:11:00,959
few seconds actually

165
00:11:15,190 --> 00:11:12,870
and you can see the jolt the third stage

166
00:11:17,030 --> 00:11:15,200
has now separated the single

167
00:11:19,110 --> 00:11:17,040
liquid-fueled engine shut down and

168
00:11:20,710 --> 00:11:19,120
dropping away in an altitude of about

169
00:11:23,269 --> 00:11:20,720
125

170
00:11:25,829 --> 00:11:23,279
statute miles

171
00:11:27,990 --> 00:11:25,839
the third stage performs an avoidance

172
00:11:35,430 --> 00:11:28,000
maneuver by opening a valve in its

173
00:11:35,440 --> 00:11:53,670
how do you read that

174
00:11:57,910 --> 00:11:55,190
and getting word from the visiting

175
00:12:00,550 --> 00:11:57,920
vehicle officer all antennas and the

176
00:12:02,389 --> 00:12:00,560
solar arrays have deployed so all those

177
00:12:04,790 --> 00:12:02,399
pre-programmed commands executed

178
00:12:06,389 --> 00:12:04,800
successfully the cores and telemetry

179
00:12:08,150 --> 00:12:06,399
antennas

180
00:12:10,550 --> 00:12:08,160
out and the solar arrays deployed to

181
00:12:13,829 --> 00:12:10,560
begin providing power to the soyuz

182
00:12:18,629 --> 00:12:15,590
again it's set on an altitude of about

183
00:12:22,110 --> 00:12:18,639
125 statute miles it's going to orbit at

184
00:12:25,190 --> 00:12:22,120
a an altitude of about 143 by

185
00:12:26,949 --> 00:12:25,200
118 miles but this orbit of course is

186
00:12:29,350 --> 00:12:26,959
going to be raised systematically over

187
00:12:30,790 --> 00:12:29,360
the course of the next six hours placing