
NASA
SPACESTATION
LIVE

1
00:00:10,709 --> 00:00:08,310
tomorrow's 44 soyuz relocation by

2
00:00:12,950 --> 00:00:10,719
commander padalka kornienko and kelly

3
00:00:14,709 --> 00:00:12,960
will be the first such relocation of a

4
00:00:17,590 --> 00:00:14,719
soyuz outside the international space

5
00:00:19,910 --> 00:00:17,600
station since november 1st of 2013 when

6
00:00:22,230 --> 00:00:19,920
the expedition 37 crew

7
00:00:25,750 --> 00:00:22,240
managed to do that they re they

8
00:00:28,150 --> 00:00:25,760
relocated their soyuz from the rasvit

9
00:00:29,750 --> 00:00:28,160
module to the zvezda

10
00:00:32,229 --> 00:00:29,760
and that crew commander fyodor

11
00:00:35,510 --> 00:00:32,239
yurchikhin and nasa astronaut karen

12
00:00:37,910 --> 00:00:35,520
nybergen um and luca parmitano for issa

13
00:00:39,910 --> 00:00:37,920

astronaut and you did this

14
00:00:43,350 --> 00:00:39,920
almost two years ago now so what do you

15
00:00:45,590 --> 00:00:43,360
remember from this relocation

16
00:00:49,110 --> 00:00:45,600
well i remember everything because it's

17
00:00:51,110 --> 00:00:49,120
uh it's very interesting uh

18
00:00:53,910 --> 00:00:51,120
it's very interesting operation

19
00:00:55,189 --> 00:00:53,920
for which we train a lot

20
00:00:57,910 --> 00:00:55,199
it's um

21
00:00:59,270 --> 00:00:57,920
it's done manually which means that for

22
00:01:01,830 --> 00:00:59,280
the first time

23
00:01:04,310 --> 00:01:01,840
uh in in my case in our in our

24
00:01:06,149 --> 00:01:04,320
expedition the commander myself took

25
00:01:07,270 --> 00:01:06,159
manual control of the spacecraft in

26
00:01:09,109 --> 00:01:07,280
order to

27
00:01:11,510 --> 00:01:09,119
detach it from the space station or

28
00:01:14,950 --> 00:01:11,520
undock and then fly it around manually

29
00:01:15,830 --> 00:01:14,960
again and do a manual docking and it's

30
00:01:18,230 --> 00:01:15,840
um

31
00:01:20,710 --> 00:01:18,240
it is intense because just like in a

32
00:01:21,990 --> 00:01:20,720
sci-fi movie you are um

33
00:01:24,950 --> 00:01:22,000
you are

34
00:01:27,910 --> 00:01:24,960
flying around a big space station which

35
00:01:29,670 --> 00:01:27,920
is actually flying already at uh 28 000

36
00:01:31,749 --> 00:01:29,680
kilometers an hour or seventy thousand

37
00:01:34,390 --> 00:01:31,759
four hundred miles an hour and then you

38
00:01:36,789 --> 00:01:34,400

are flying around it to go from one dock

39
00:01:38,149 --> 00:01:36,799
docking port to another so it is it is

40
00:01:40,710 --> 00:01:38,159
interesting it

41
00:01:44,230 --> 00:01:40,720
it's quick in a way compared to other

42
00:01:46,069 --> 00:01:44,240
operations but um but very intense so

43
00:01:48,469 --> 00:01:46,079
you say it's quick what does this day

44
00:01:50,630 --> 00:01:48,479
look like for the crew that's going into

45
00:01:52,789 --> 00:01:50,640
the soyuz from start to finish from the

46
00:01:54,149 --> 00:01:52,799
time you get in to the time you are

47
00:01:55,670 --> 00:01:54,159
docked and back in the international

48
00:01:58,630 --> 00:01:55,680
space station what is that day like so

49
00:02:00,709 --> 00:01:58,640
strangely enough the longest part of of

50
00:02:02,630 --> 00:02:00,719
the operations is making sure that

51
00:02:04,310 --> 00:02:02,640
everything that everything that you open

52
00:02:07,030 --> 00:02:04,320
and close is going to be completely

53
00:02:08,790 --> 00:02:07,040
sealed you don't want any surprise leaks

54
00:02:11,110 --> 00:02:08,800
once you unlock the

55
00:02:13,350 --> 00:02:11,120
the spacecraft both on the on the

56
00:02:15,670 --> 00:02:13,360
station side you don't want to lose

57
00:02:18,470 --> 00:02:15,680
atmosphere from the space station and on

58
00:02:20,229 --> 00:02:18,480
the on the spacecraft side so we do we

59
00:02:22,390 --> 00:02:20,239
do what that what is what what are

60
00:02:24,309 --> 00:02:22,400
called leak checks making sure that

61
00:02:27,750 --> 00:02:24,319
everything is perfectly sealed

62
00:02:29,589 --> 00:02:27,760
and then you also have to be ready to

63
00:02:32,150 --> 00:02:29,599

come back to earth because once the

64
00:02:34,550 --> 00:02:32,160
spacecraft is out if something goes

65
00:02:36,630 --> 00:02:34,560
wrong then the crew is coming down so

66
00:02:39,670 --> 00:02:36,640
you have to consider a day

67
00:02:43,110 --> 00:02:41,589
you know if as if you're not coming back

68
00:02:45,270 --> 00:02:43,120
to the space station and you may end up

69
00:02:47,430 --> 00:02:45,280
coming down to earth so all this

70
00:02:49,670 --> 00:02:47,440
preparation takes takes time

71
00:02:51,589 --> 00:02:49,680
in excess of an hour

72
00:02:54,710 --> 00:02:51,599
then after you undock the actual fly

73
00:02:56,390 --> 00:02:54,720
around is probably only between 15 and

74
00:02:58,149 --> 00:02:56,400
20 minutes it depends on on the

75
00:03:01,110 --> 00:02:58,159
commander's technique

76
00:03:04,149 --> 00:03:01,120
or the pilot's technique really and and

77
00:03:06,790 --> 00:03:04,159
then the docking phase is another

78
00:03:09,830 --> 00:03:06,800
another five minutes or so once you're

79
00:03:11,589 --> 00:03:09,840
docked everything goes back to the same

80
00:03:13,589 --> 00:03:11,599
operations that you do on the on the

81
00:03:15,670 --> 00:03:13,599
very first time you dock

82
00:03:18,149 --> 00:03:15,680
so and not more leak checks making sure

83
00:03:20,229 --> 00:03:18,159
that now you haven't damaged the docking

84
00:03:22,550 --> 00:03:20,239
port then everything is perfectly sealed

85
00:03:24,789 --> 00:03:22,560
between the spacecraft the soyuz and the

86
00:03:27,030 --> 00:03:24,799
space station and then you can open the

87
00:03:27,910 --> 00:03:27,040
door again so all in all we are talking

88
00:03:31,030 --> 00:03:27,920

about

89
00:03:33,110 --> 00:03:31,040
um four hour procedure when you consider

90
00:03:34,550 --> 00:03:33,120
the normal delays and all the normal

91
00:03:36,390 --> 00:03:34,560
checks that you have to do and there's

92
00:03:37,830 --> 00:03:36,400
20 minutes of flight time so four hours

93
00:03:40,070 --> 00:03:37,840
and only 20 minutes you're actually

94
00:03:42,550 --> 00:03:40,080
outside the space station but what is

95
00:03:43,990 --> 00:03:42,560
that like for you obviously leaving i

96
00:03:45,190 --> 00:03:44,000
don't know if i want to say the comforts

97
00:03:47,350 --> 00:03:45,200
of the space station but you've been

98
00:03:48,869 --> 00:03:47,360
there now for a few months at this point

99
00:03:50,550 --> 00:03:48,879
so what was it like pulling away and

100
00:03:52,390 --> 00:03:50,560
thinking i might not be going back there

101
00:03:54,550 --> 00:03:52,400
if something goes wrong so for me it

102
00:03:57,670 --> 00:03:54,560
happened only about 10 days before

103
00:04:00,149 --> 00:03:57,680
coming back to earth so

104
00:04:03,910 --> 00:04:00,159
that the thought of having to leave in

105
00:04:06,789 --> 00:04:03,920
emergency was was not daunting because

106
00:04:09,030 --> 00:04:06,799
uh you know we we were towards the end

107
00:04:10,869 --> 00:04:09,040
of our mission we had completed all

108
00:04:12,550 --> 00:04:10,879
everything that we were going to do but

109
00:04:14,070 --> 00:04:12,560
at the same time of course you want you

110
00:04:15,830 --> 00:04:14,080
know you want to come back you want to

111
00:04:16,870 --> 00:04:15,840
continue helping with with your with

112
00:04:17,909 --> 00:04:16,880
your crew

113
00:04:20,229 --> 00:04:17,919

and

114
00:04:21,349 --> 00:04:20,239
so you you just you want to you want to

115
00:04:23,670 --> 00:04:21,359
go back

116
00:04:24,950 --> 00:04:23,680
i can guarantee you that

117
00:04:26,950 --> 00:04:24,960
certainly we are not going to any

118
00:04:28,550 --> 00:04:26,960
emergency any any situation that is

119
00:04:30,629 --> 00:04:28,560
anomalous we are going to take it very

120
00:04:32,150 --> 00:04:30,639
seriously but at the same time we are

121
00:04:34,230 --> 00:04:32,160
going to make sure that we do everything

122
00:04:36,390 --> 00:04:34,240
we can to go back to the space station

123
00:04:39,590 --> 00:04:36,400
so it is the space station at the time

124
00:04:41,909 --> 00:04:39,600
is your home it's uh it's your it's your

125
00:04:43,990 --> 00:04:41,919
comfort you have your crew quarters

126
00:04:45,110 --> 00:04:44,000
which is your room with your things and

127
00:04:47,350 --> 00:04:45,120
you want to make sure that they come

128
00:04:49,189 --> 00:04:47,360
back with you at one point or another so

129
00:04:51,270 --> 00:04:49,199
certainly um

130
00:04:53,670 --> 00:04:51,280
you're you're focused on coming back to

131
00:04:55,830 --> 00:04:53,680
the space station so once you leave you

132
00:04:57,590 --> 00:04:55,840
get a good view of the outside of the

133
00:04:58,950 --> 00:04:57,600
space station do you get to see kind of

134
00:04:59,990 --> 00:04:58,960
different parts that you don't normally

135
00:05:01,990 --> 00:05:00,000
get to see

136
00:05:03,670 --> 00:05:02,000
absolutely um

137
00:05:04,950 --> 00:05:03,680
when you when you when you come in for

138
00:05:07,350 --> 00:05:04,960

the first time when you're docking

139
00:05:09,350 --> 00:05:07,360
you're soft you're focused on on the

140
00:05:10,950 --> 00:05:09,360
automatic operations and so your

141
00:05:12,469 --> 00:05:10,960
attention is really focused on the

142
00:05:15,110 --> 00:05:12,479
cameras and

143
00:05:16,870 --> 00:05:15,120
the screens that you have on the cockpit

144
00:05:19,270 --> 00:05:16,880
that you really don't have a lot of time

145
00:05:21,749 --> 00:05:19,280
to to look outside and and see what's

146
00:05:23,830 --> 00:05:21,759
happening and you you come in straight

147
00:05:26,150 --> 00:05:23,840
for your docking port so you don't do a

148
00:05:29,029 --> 00:05:26,160
fly around the space station you see

149
00:05:30,469 --> 00:05:29,039
um the the the structure and you see the

150
00:05:32,310 --> 00:05:30,479
direction that you're going you're

151
00:05:35,110 --> 00:05:32,320
coming in and you go straight for your

152
00:05:38,070 --> 00:05:35,120
docking port now for the first time

153
00:05:39,749 --> 00:05:38,080
uh once once the initial set the course

154
00:05:41,270 --> 00:05:39,759
is done you have a chance to look

155
00:05:42,790 --> 00:05:41,280
outside you're going to be looking even

156
00:05:45,510 --> 00:05:42,800
through the cameras and different parts

157
00:05:48,230 --> 00:05:45,520
of the space station uh and

158
00:05:50,550 --> 00:05:48,240
you know it's it's it's amazing how

159
00:05:52,950 --> 00:05:50,560
similar how accurate it is with the

160
00:05:55,110 --> 00:05:52,960
simulations that we do on the ground

161
00:05:57,270 --> 00:05:55,120
so talk a little bit about why why did

162
00:05:59,510 --> 00:05:57,280
why was it important for you to move the

163
00:06:02,070 --> 00:05:59,520

soyuz and why was it important for this

164
00:06:04,390 --> 00:06:02,080
crew tomorrow to move the soyuz it is

165
00:06:07,270 --> 00:06:04,400
extremely important for

166
00:06:09,590 --> 00:06:07,280
at least two reasons that i can think of

167
00:06:11,830 --> 00:06:09,600
the first reason is that in order to

168
00:06:13,510 --> 00:06:11,840
dock to the space station

169
00:06:16,230 --> 00:06:13,520
you have to

170
00:06:18,469 --> 00:06:16,240
move the whole space station in a

171
00:06:19,990 --> 00:06:18,479
position that will allow the docking for

172
00:06:22,710 --> 00:06:20,000
the soyuz now the soil is actually

173
00:06:24,390 --> 00:06:22,720
obviously smaller uh it has less fuel

174
00:06:26,469 --> 00:06:24,400
the space station though is much bigger

175
00:06:29,029 --> 00:06:26,479
you want to preserve that fuel so it's

176
00:06:31,350 --> 00:06:29,039
it's um it's energy and momentum uh

177
00:06:33,830 --> 00:06:31,360
management and also resource resource

178
00:06:35,510 --> 00:06:33,840
management so you want to put both the

179
00:06:37,110 --> 00:06:35,520
station and the and the soyuz that's

180
00:06:39,110 --> 00:06:37,120
coming in the best possible

181
00:06:43,350 --> 00:06:39,120
configuration to make the docking

182
00:06:44,309 --> 00:06:43,360
expeditious so since um the mission uh

183
00:06:46,870 --> 00:06:44,319
iris

184
00:06:48,870 --> 00:06:46,880
is coming up with uh my colleague andrus

185
00:06:50,469 --> 00:06:48,880
morgenstern and his two crew members

186
00:06:52,629 --> 00:06:50,479
they want to make that condition for

187
00:06:55,350 --> 00:06:52,639
docking the easiest possible bot for the

188
00:06:56,950 --> 00:06:55,360

station and uh and and um

189
00:06:59,110 --> 00:06:56,960
soyuz

190
00:07:01,110 --> 00:06:59,120
and and so they're going to free up a

191
00:07:04,150 --> 00:07:01,120
port they will they will make the

192
00:07:05,589 --> 00:07:04,160
docking conditions simpler

193
00:07:07,189 --> 00:07:05,599
for them that

194
00:07:09,749 --> 00:07:07,199
for them on the space station doing the

195
00:07:11,830 --> 00:07:09,759
fly around is already is a simple

196
00:07:13,510 --> 00:07:11,840
operation relatively simple operation

197
00:07:16,070 --> 00:07:13,520
because now the space station doesn't

198
00:07:18,550 --> 00:07:16,080
need to move which that's the space

199
00:07:20,070 --> 00:07:18,560
station keeps flying and it's in its

200
00:07:23,670 --> 00:07:20,080
orientation

201
00:07:25,909 --> 00:07:23,680
uh without any any loss of energy or

202
00:07:28,150 --> 00:07:25,919
resources and then you just use a very

203
00:07:29,670 --> 00:07:28,160
tiny bit of resources to move the the

204
00:07:31,350 --> 00:07:29,680
capsule from one docking port to the

205
00:07:34,629 --> 00:07:31,360
other and when i say a tiny bit of

206
00:07:37,270 --> 00:07:34,639
resources we are trained to do a docking

207
00:07:39,510 --> 00:07:37,280
using less than 10 kilograms of fuel oh

208
00:07:41,670 --> 00:07:39,520
wow well luca thank you so much for

209
00:07:44,150 --> 00:07:41,680
joining us to talk about the relocation

210
00:07:47,270 --> 00:07:44,160
of the soyuz uh once again this was luca

211
00:07:48,950 --> 00:07:47,280
parmitano an issa astronaut who was on

212
00:07:52,790 --> 00:07:48,960
the last relocation