STEMonstrations

SPACEWALK PART 1: SAFETY & TRAINING

1
00:00:00,834 --> 00:00:15,248
[MUSIC]

2
00:00:15,248 --> 00:00:16,649
>> WELCOME TO THE QUEST AIRLOCK

3
00:00:16,649 --> 00:00:17,484
ON THE INTERNATIONAL

4
00:00:17,484 --> 00:00:18,351
SPACE STATION.

5
00:00:18,351 --> 00:00:19,052
I'M RICKY ARNOLD,

6
00:00:19,052 --> 00:00:20,253
EXPEDITION FLIGHT 56

7
00:00:20,253 --> 00:00:21,755
FLIGHT ENGINEER FROM NASA.

8
00:00:21,755 --> 00:00:22,722
TODAY WE'RE GONNA TALK ABOUT

9
00:00:22,722 --> 00:00:24,157
ONE OF MY FAVORITE TOPICS:

10
00:00:24,157 --> 00:00:25,392
EXTRAVEHICULAR ACTIVITY,

11
00:00:25,392 --> 00:00:26,559
OR EVA.

12
00:00:26,559 --> 00:00:27,727
GOING OUT ON AN EVA

13
00:00:27,727 --> 00:00:28,762

OR A SPACEWALK HAS BEEN

14
00:00:28,762 --> 00:00:29,662
ONE OF THE MOST AMAZING

15
00:00:29,662 --> 00:00:31,264
EXPERIENCES OF MY LIFE.

16
00:00:31,264 --> 00:00:32,399
BUT IT'S ALSO ONE OF THE MOST

17
00:00:32,399 --> 00:00:34,000
COMPLICATED AND DANGEROUS THINGS

18
00:00:34,000 --> 00:00:36,169
WE DO DURING HUMAN SPACE FLIGHT.

19
00:00:36,169 --> 00:00:37,270
THERE'S A LOT OF EQUIPMENT

20
00:00:37,270 --> 00:00:38,738
TO PREPARE AND MAINTAIN,

21
00:00:38,738 --> 00:00:39,839
AND WE DO MONTHS OF TRAINING

22
00:00:39,839 --> 00:00:42,008
TO MAKE EACH EVA A SUCCESS.

23
00:00:42,008 --> 00:00:42,976
IF YOU THINK IT SOUNDS

24
00:00:42,976 --> 00:00:44,244
COMPLICATED, YOU SHOULD SEE

25
00:00:44,244 --> 00:00:45,578
ALL OF IT IN ACTION.

26
00:00:45,578 --> 00:00:46,646
LET'S START WITH TRAINING

27
00:00:46,646 --> 00:00:47,814
AND HOW WE GET READY FOR

28
00:00:47,814 --> 00:00:50,016
A SPACEWALK.

29
00:00:50,016 --> 00:00:51,017
>> SPACE IS AN EXTREME

30
00:00:51,017 --> 00:00:51,951
ENVIRONMENT THAT PRESENTS

31
00:00:51,951 --> 00:00:53,119
MANY HAZARDS.

32
00:00:53,119 --> 00:00:54,053
IF WE'RE GONNA GO OUTSIDE

33
00:00:54,053 --> 00:00:55,522
THE SAFETY OF THE ISS,

34
00:00:55,522 --> 00:00:56,890
WE HAVE TO BE PREPARED.

35
00:00:56,890 --> 00:00:58,358
THAT'S WHY EVAs ARE DESIGNED

36
00:00:58,358 --> 00:00:59,559
WITH SAFETY AS

37
00:00:59,559 --> 00:01:01,361
THE UTMOST PRIORITY.

38
00:01:01,361 --> 00:01:02,262

WE ASTRONAUTS SPEND

39
00:01:02,262 --> 00:01:03,830
A LOT OF TIME IN THE CLASSROOM,

40
00:01:03,830 --> 00:01:05,198
JUST LIKE YOU ARE NOW,

41
00:01:05,198 --> 00:01:06,599
LEARNING ABOUT THE HARDWARE

42
00:01:06,599 --> 00:01:07,967
WE'LL BE USING AND THE SPECIFIC

43
00:01:07,967 --> 00:01:09,135
PARTS OF THE SPACE STATION

44
00:01:09,135 --> 00:01:10,403
WE'LL BE WORKING ON.

45
00:01:10,403 --> 00:01:11,738
THEN WE GET TO GO SPEND

46
00:01:11,738 --> 00:01:13,106
A LOT OF TIME TRAINING IN

47
00:01:13,106 --> 00:01:15,041
NASA'S GIANT POOL, CALLED

48
00:01:15,041 --> 00:01:16,609
THE NEUTRAL BUOYANCY LAB,

49
00:01:16,609 --> 00:01:17,977
OR NBL.

50
00:01:17,977 --> 00:01:19,379
SINCE IT'S IMPOSSIBLE

51
00:01:19,379 --> 00:01:20,747
TO SIMULATE MICROGRAVITY

52
00:01:20,747 --> 00:01:22,782
ON EARTH, THE NEXT BEST OPTION

53
00:01:22,782 --> 00:01:23,883
IS WATER--

54
00:01:23,883 --> 00:01:26,519
6.2 MILLION GALLONS OF IT.

55
00:01:26,519 --> 00:01:28,488
THE NBL IS 40 FEET DEEP,

56
00:01:28,488 --> 00:01:30,557
202 FEET IN LENGTH,

57
00:01:30,557 --> 00:01:32,792
AND 102 FEET IN WIDTH.

58
00:01:32,792 --> 00:01:33,760
YOU NEED A LOT OF ROOM TO HAVE

59
00:01:33,760 --> 00:01:35,495
A FULL SCALE WORKING MODEL

60
00:01:35,495 --> 00:01:37,430
OF THE ISS, WHICH WE NEED

61
00:01:37,430 --> 00:01:39,165
FOR PRACTICING OUR EVA MANEUVERS

62
00:01:39,165 --> 00:01:41,534
AND ASSIGNED TASKS.

63
00:01:41,534 --> 00:01:43,102

WE GET SUITED UP AND WEIGHTED

64
00:01:43,102 --> 00:01:44,337
SO THAT WE'RE NEUTRALLY BUOYANT

65
00:01:44,337 --> 00:01:45,572
IN THE WATER,

66
00:01:45,572 --> 00:01:46,906
SO WE DON'T SINK TO THE BOTTOM

67
00:01:46,906 --> 00:01:47,841
AND WE DON'T FLOAT

68
00:01:47,841 --> 00:01:48,775
TO THE SURFACE.

69
00:01:48,775 --> 00:01:50,076
IT'S A GREAT WAY TO SIMULATE

70
00:01:50,076 --> 00:01:51,077
THE MICROGRAVITY

71
00:01:51,077 --> 00:01:53,079
WE'LL BE EXPERIENCING.

72
00:01:53,079 --> 00:01:54,547
WE DO SEVERAL DRESS REHEARSALS

73
00:01:54,547 --> 00:01:56,649
OF EVA BEFORE WE LAUNCH.

74
00:01:56,649 --> 00:01:57,917
THIS GIVES US THE OPPORTUNITY

75
00:01:57,917 --> 00:01:59,185
TO PREPARE FOR ANY ANOMALIES

76
00:01:59,185 --> 00:02:00,753
THAT MAY OCCUR.

77
00:02:00,753 --> 00:02:02,055
WE SPEND AT LEAST FIVE HOURS

78
00:02:02,055 --> 00:02:03,189
PRACTICING IN THE NBL

79
00:02:03,189 --> 00:02:04,591
FOR EVERY ONE HOUR PLANNED

80
00:02:04,591 --> 00:02:06,092
FOR THE SPACEWALK.

81
00:02:06,092 --> 00:02:07,327
SO WE ARE VERY WELL PREPARED

82
00:02:07,327 --> 00:02:08,495
TO EXECUTE THE EVAs

83
00:02:08,495 --> 00:02:10,497
ONCE WE ARE IN ORBIT.

84
00:02:10,497 --> 00:02:11,764
ONCE WE ARE UP IN ORBIT,

85
00:02:11,764 --> 00:02:13,933
THE EVA PREPARATION CONTINUES.

86
00:02:13,933 --> 00:02:15,101
FIRST, WE MUST PERFORM

87
00:02:15,101 --> 00:02:16,569
A PRE-BREATHE PROTOCOL

88
00:02:16,569 --> 00:02:17,871

TO DISPLACE THE NITROGEN

89
00:02:17,871 --> 00:02:19,239
IN OUR TISSUES AND HELP PREVENT

90
00:02:19,239 --> 00:02:20,206
A CONDITION CALLED

91
00:02:20,206 --> 00:02:21,774
DECOMPRESSION SICKNESS.

92
00:02:21,774 --> 00:02:22,909
DURING PRE-BREATHE,

93
00:02:22,909 --> 00:02:24,777
WE BREATHE 100% PURE OXYGEN

94
00:02:24,777 --> 00:02:25,979
AND DO SOME LIGHT EXERCISE

95
00:02:25,979 --> 00:02:27,180
TO HELP PURGE THE NITROGEN

96
00:02:27,180 --> 00:02:28,848
FROM OUR BODIES.

97
00:02:28,848 --> 00:02:30,416
DURING PRE-BREATHE,

98
00:02:30,416 --> 00:02:31,651
WE WILL ALSO DON OUR

99
00:02:31,651 --> 00:02:33,653
EXTRAVEHICULAR MOBILITY UNIT,

100
00:02:33,653 --> 00:02:34,921
OR EMU.

101
00:02:34,921 --> 00:02:35,955
THIS IS A FANCY NAME

102
00:02:35,955 --> 00:02:37,423
FOR A SPACESUIT.

103
00:02:37,423 --> 00:02:38,591
THE SPACESUIT IS BASICALLY

104
00:02:38,591 --> 00:02:39,792
ITS OWN SPACECRAFT

105
00:02:39,792 --> 00:02:40,994
SHAPED LIKE A HUMAN.

106
00:02:40,994 --> 00:02:42,161
THERE IS USUALLY A RED STRIPE

107
00:02:42,161 --> 00:02:43,730
ON THE LEG OF ONE ASTRONAUT

108
00:02:43,730 --> 00:02:45,265
BUT NOT THE OTHER, SO THAT

109
00:02:45,265 --> 00:02:47,033
GROUND CAN TELL WHO IS WHO.

110
00:02:47,033 --> 00:02:48,368
TO ENSURE OUR SAFETY

111
00:02:48,368 --> 00:02:49,702
AT ALL TIMES, WE ARE ALWAYS

112
00:02:49,702 --> 00:02:51,170
AWARE OF OUR SAFETY TETHERS

113
00:02:51,170 --> 00:02:52,238

AND WHERE WE ARE IN RELATION

114
00:02:52,238 --> 00:02:53,940
TO OUR SPACEWALKING BUDDY.

115
00:02:53,940 --> 00:02:55,408
>> HEY, BUDDY.

116
00:02:55,408 --> 00:02:56,776
>> THERE'S A FELLOW CREW MEMBER

117
00:02:56,776 --> 00:02:58,111
CALLED THE IV--

118
00:02:58,111 --> 00:03:00,046
THE INTERVEHICULAR CREW--

119
00:03:00,046 --> 00:03:01,414
ON THE INSIDE OF THE AIRLOCK

120
00:03:01,414 --> 00:03:02,582
WATCHING AND COMMUNICATING

121
00:03:02,582 --> 00:03:05,418
WITH US AS THE EVA PROGRESSES.

122
00:03:05,418 --> 00:03:06,819
WE ARE ALSO PREPARED FOR

123
00:03:06,819 --> 00:03:08,187
SEVERAL CONTINGENCIES,

124
00:03:08,187 --> 00:03:09,389
SHOULD THEY OCCUR.

125
00:03:09,389 --> 00:03:10,356
FIRST, WE ARE TRAINED ON

126
00:03:10,356 --> 00:03:11,524
THE USE OF A JETPACK

127
00:03:11,524 --> 00:03:12,725
THAT CAN BE USED TO MANEUVER

128
00:03:12,725 --> 00:03:13,526
IN THE EVENT OF

129
00:03:13,526 --> 00:03:14,861
AN EMERGENCY RESCUE.

130
00:03:14,861 --> 00:03:16,029
IT'S CALLED A SAFER, OR

131
00:03:16,029 --> 00:03:18,665
SIMPLIFIED AID FOR EVA RESCUE.

132
00:03:20,266 --> 00:03:21,701
THE VIEW DURING AN EVA

133
00:03:21,701 --> 00:03:22,969
IS MAGNIFICENT.

134
00:03:22,969 --> 00:03:24,437
IT'S BEAUTIFUL OUT THERE.

135
00:03:24,437 --> 00:03:25,872
IT'S ALSO EXTREMELY DANGEROUS,

136
00:03:25,872 --> 00:03:27,340
BUT OUR MONTHS OF PREPARATION

137
00:03:27,340 --> 00:03:28,575
AND ALL OF THOSE DEDICATED

138
00:03:28,575 --> 00:03:30,043

PEOPLE WORKING ON THE GROUND,

139
00:03:30,043 --> 00:03:32,178
WORKING AROUND THE CLOCK, ENSURE

140
00:03:32,178 --> 00:03:33,479
WE ARE AS SAFE AS POSSIBLE

141
00:03:33,479 --> 00:03:35,548
WHEN WE WORK OUTSIDE THE ISS.

142
00:03:35,548 --> 00:03:36,816
EVAs HAVE ALLOWED US TO BUILD

143
00:03:36,816 --> 00:03:38,418
AND MAINTAIN THE ISS, REPAIR

144
00:03:38,418 --> 00:03:39,953
MISSION-CRITICAL HARDWARE,

145
00:03:39,953 --> 00:03:41,688
INVESTIGATE MALFUNCTIONS,

146
00:03:41,688 --> 00:03:43,089
INSTALL NEW HARDWARE--

147
00:03:43,089 --> 00:03:45,525
AND THE VIEW, UNBELIEVABLE.