1
00:00:00,820 --> 00:00:01,229
\h

2
00:00:01,230 --> 00:00:04,260
Chris Ferguson, Commander, STS-135: The magic of the space shuttle is just its enormity, it's

3
00:00:04,400 --> 00:00:10,666
huge and it flies up and back and there will be no parallel like that, I think, for 100 years.

4
00:00:11,410 --> 00:00:14,159
Bob Crippen, Pilot, STS-1: I think the shuttle has been one of the most marvelous vehicles

5
00:00:14,160 --> 00:00:17,293
that has ever gone into space or done anything.

6
00:00:18,430 --> 00:00:20,496
Bob Sieck, Former Shuttle Launch Director: You can imagine the early spacecraft, barely the

7
00:00:22,430 --> 00:00:28,296
size of a desk for one or two astronauts, now the spacecraft is the size of an airliner.

8
00:00:30,620 --> 00:00:33,189
Wayne Bingham, United Space Alliance When you saw it, you thought, 'How can something like

9
00:00:33,190 --> 00:00:34,870
this fly?' You've got all these tiles on the bottom of it and it was like bricks,

10
00:00:36,910 --> 00:00:39,243
if you want to look at it that way.

11
00:00:39,620 --> 00:00:40,176
NARRATOR: There was never a spacecraft like it. As large as a DC-9 airliner,

12
00:00:44,130 --> 00:00:44,683
but strong enough to withstand the vacuum of space . . .

13
00:00:47,310 --> 00:00:52,310

big enough to carry huge satellites and built to be reused dozens of times.

14
00:00:52,840 --> 00:00:53,830
And it had wings, just like the imagined spaceships science fiction writers designed

15
00:00:57,450 --> 00:01:00,050
for their fantastic tales of adventure.

16
00:01:00,200 --> 00:01:00,870
SEICK: And the sophistication of that, again compared to the earlier vehicles,

17
00:01:04,730 --> 00:01:09,596
was difficult to get accustomed to, particularly since we were making the

18
00:01:10,490 --> 00:01:15,956
transition from the era of wires and switches and meters to digital and computers.

19
00:01:18,700 --> 00:01:22,966
WAYNE BINGHAM: When STS-1 came in, it was a totally new vehicle.

20
00:01:23,410 --> 00:01:24,323
A lot of work left to be done on it. We still had to do hydraulic lines in the aft,

21
00:01:28,030 --> 00:01:34,363
APU lines in the aft. It had well over thousands of tile to go do yet to put on the spacecraft.

22
00:01:34,380 --> 00:01:35,086
The timeframe as far as getting the overall integrated schedule,

23
00:01:37,940 --> 00:01:39,110
it was really hard and difficult on a lot of people. Pretty much three shifts a day,

24
00:01:42,370 --> 00:01:45,836
round the clock, seven days a week, 365 days a year.

25
00:01:46,800 --> 00:01:47,956
NARRATOR: NASA built five shuttles to go into space, naming them after ships of

26
00:01:50,910 --> 00:01:53,310
exploration in previous generations:

27
00:01:53,730 --> 00:01:57,463
Columbia, Challenger, Discovery, Atlantis and Endeavour.

28
00:01:59,220 --> 00:01:59,500
They were larger than any other spacecraft, capable of carrying 25 tons in its

29
00:02:04,140 --> 00:02:05,673
60-foot-long cargo bay.

30
00:02:07,400 --> 00:02:08,213
Another difference with previous spacecraft: shuttles could bring large payloads back,

31
00:02:12,320 --> 00:02:12,593
giving scientists a chance to see their experiments' results firsthand.

32
00:02:16,780 --> 00:02:17,353
The shuttles also carried more people on a single flight than ever before.

33
00:02:21,140 --> 00:02:25,340
The shuttle flew crews of eight. The previous record was three.

34
00:02:26,640 --> 00:02:27,550
Shuttle astronauts also looked different than the fliers of previous programs.

35
00:02:30,930 --> 00:02:36,463
Women and minorities would be seen working in space throughout the shuttle program.

36
00:02:37,200 --> 00:02:42,733
Astronauts ranging in age to John Glenn's 77 made their way into space on shuttles.

37
00:02:43,390 --> 00:02:43,863
Scientists have used the space shuttle as a platform to study our own planet,

38
00:02:48,050 --> 00:02:53,116

life and materials science, our solar system . . . and the universe itself.

39
00:02:54,710 --> 00:02:55,390
Perhaps its most famous accomplishment is NASA's Hubble Space Telescope,

40
00:02:58,830 --> 00:02:59,103
which has dazzled us for more than 20 years with discoveries wrapped up in unimaginable beauty.

41
00:03:04,890 --> 00:03:05,810
Five teams of astronauts worked on the observatory as it orbited Earth, giving life and

42
00:03:09,770 --> 00:03:12,836
capabilities far beyond what it launched with.

43
00:03:13,310 --> 00:03:15,683
Mike Coats, Three-time Shuttle Astronaut: Servicing the Hubble Space Telescope is one of the

44
00:03:17,070 --> 00:03:17,573
space shuttle's finest accomplishments. We've had several servicing missions.

45
00:03:21,700 --> 00:03:27,566
They saved the Hubble Space Telescope on the very first mission, if you will, that we've

46
00:03:29,110 --> 00:03:34,176
extended the life of the Hubble Space Telescope so many years and the things

47
00:03:35,990 --> 00:03:40,590
we've learned from the Hubble and from the other telescopes up there,

48
00:03:40,700 --> 00:03:42,566
is just astounding nowadays.

49
00:03:43,180 --> 00:03:44,320
NARRATOR: These accomplishments did not come about without struggles.

50
00:03:46,640 --> 00:03:47,746
Accidents struck the shuttle program twice, each time provoking new introspection in the

51
00:03:51,400 --> 00:03:56,800
agency. Challenger broke up 73 seconds into flight on January 28, 1986. Columbia,

52
00:03:59,510 --> 00:04:00,466
returning to Earth following a successful scientific mission, succumbed to the forces of

53
00:04:04,420 --> 00:04:08,886
re-entry and was lost over Texas and Louisiana on February 1, 2003.

54
00:04:10,710 --> 00:04:13,576
Each shuttle had seven astronauts on board.

55
00:04:13,760 --> 00:04:16,633
Barbara Morgan, Educator Astronaut: We could have shut the program down after Challenger.

56
00:04:16,820 --> 00:04:17,280
We could have shut the program down after Columbia.

57
00:04:19,760 --> 00:04:21,526
We could have stuck our heads in the sand and let the future happen however it was going to

58
00:04:24,060 --> 00:04:24,360
happen. But we didn't. We decided to figure out what went wrong --

59
00:04:28,160 --> 00:04:29,513
more importantly than that, figure out what we did wrong --

60
00:04:30,740 --> 00:04:31,786
fix it to the best of our ability, and keep the doors open for our young people

61
00:04:34,960 --> 00:04:36,693
and keep that future open.

62
00:04:37,360 --> 00:04:43,160
LAUNCH COMMENTATOR: T-10 seconds, go for main engine start . . . seven, six, five . . .

63
00:04:44,440 --> 00:04:50,440

three engines up and burning . . . three, two , one and liftoff of space shuttle Discovery

64
00:04:51,710 --> 00:04:55,776
beginning America's new journey to the moon, Mars and beyond.

65
00:04:56,080 --> 00:04:58,613
And the vehicle has cleared the tower.

66
00:04:59,320 --> 00:05:00,433
NARRATOR: Astronauts flew shuttles back into space following each accident to

67
00:05:03,340 --> 00:05:03,713
fulfill missions and to honor the legacy of exploration.

68
00:05:06,700 --> 00:05:10,700
As the program evolved, shuttle missions grew in complexity.

69
00:05:10,840 --> 00:05:11,846
Ground teams and astronauts gained new experience in activities like spacewalking,

70
00:05:15,300 --> 00:05:18,966
using robotics, and capturing and deploying satellites.

71
00:05:19,630 --> 00:05:25,430
The next big change in the program came in 1995 when the shuttle fleet focused on a new

72
00:05:25,830 --> 00:05:27,230
destination in orbit.

73
00:05:28,400 --> 00:05:28,410
Discovery performed a flyby with the Russian space station Mir,

74
00:05:32,590 --> 00:05:33,666
then Atlantis docked with the outpost a couple months later to begin a string of shuttle

75
00:05:37,380 --> 00:05:38,380
visits bringing supplies and new astronauts to take turns living in space for months at

76
00:05:42,180 --> 00:05:45,713
a time, far longer than any American had done before.

77
00:05:47,140 --> 00:05:47,290
In 1998, NASA began a mission that would take more than 10 years and 36 shuttle flights to

78
00:05:52,990 --> 00:05:53,296
complete. It would push the astronauts, space workers and the shuttles farther than before.

79
00:05:58,750 --> 00:05:59,620
Together with 15 other nations, NASA began construction of the largest spacecraft in history,

80
00:06:04,080 --> 00:06:06,213
the International Space Station.

81
00:06:07,040 --> 00:06:12,240
Bob Cabana commanded the first construction mission, STS-88, in December 1998.

82
00:06:13,560 --> 00:06:16,483
Bob Cabana, Four-time Shuttle Astronaut: To know what we were laying the groundwork for and

83
00:06:16,770 --> 00:06:17,136
to have it go as smoothly as it did from start to finish, that was a unique flight

84
00:06:21,870 --> 00:06:24,070
and a very rewarding opportunity.

85
00:06:24,790 --> 00:06:28,990
NARRATOR: Astronauts born in Japan, Canada, the United Kingdom,

86
00:06:30,860 --> 00:06:32,996
Australia and all over Europe carried their nations' flags into space.

87
00:06:33,390 --> 00:06:35,149
Chris Hadfield Astronaut, Canadian Space Agency: Yeah, we're all international astronauts.

88
00:06:35,150 --> 00:06:35,540

It's a worldwide program. It's the International Space Station.

89
00:06:38,960 --> 00:06:39,856
And I think that's one of the great legacies of the shuttle also is that,

90
00:06:42,930 --> 00:06:48,663
that it allowed the world to come together and build our first great outpost in space.

91
00:06:53,150 --> 00:06:54,320
NARRATOR: Astronauts moved into the International Space Station in 2000,

92
00:06:56,780 --> 00:06:59,713
and spaceflight success was redefined again.

93
00:07:00,180 --> 00:07:02,629
Dan Tani, Shuttle Astronaut, Station Resident: Now of course sort of the pinnacle of an

94
00:07:02,630 --> 00:07:02,826
astronaut career is to go live on the space station.

95
00:07:05,900 --> 00:07:07,150
NARRATOR: Working in crews of two, three and six as the station grew, the astronauts

96
00:07:10,250 --> 00:07:14,516
performed experiments, learned how to refine station systems and

97
00:07:14,980 --> 00:07:15,633
acclimated themselves to the world of weightlessness.

98
00:07:17,860 --> 00:07:18,090
TANI: We had bedrooms, we had laboratory, we had windows to take pictures out of.

99
00:07:23,030 --> 00:07:23,066
It was a fully functioning laboratory, so it was just an awesome place to live.

100
00:07:28,260 --> 00:07:29,570
You get used to zero-g, and then you get used to sort of the daily operations,

101
00:07:32,150 --> 00:07:32,230
what you have to do every day. Talk to the ground, find some time to have your meals

102
00:07:37,670 --> 00:07:41,670
and call your family and write your e-mails to your friends.

103
00:07:42,040 --> 00:07:47,306
I found it very easy to adapt to living in space and I really enjoyed it a lot.

104
00:07:48,280 --> 00:07:49,526
NARRATOR: Crews also took on in-orbit repairs -- including to the shuttle itself and the

105
00:07:52,900 --> 00:07:54,766
International Space Station.

106
00:07:55,690 --> 00:07:56,396
NARRATOR: The last flight of the storied Space Shuttle Program, STS-135, will carry tons

107
00:08:00,850 --> 00:08:01,726
of equipment and supplies to the ISS, leaving the orbiting laboratory well-stocked for another

108
00:08:06,240 --> 00:08:08,106
decade of research in orbit.

109
00:08:08,880 --> 00:08:10,946
Four astronauts will perform the mission, working with the space station's six residents to

110
00:08:12,880 --> 00:08:13,150
unload the supplies during much of the 12-day mission.

111
00:08:16,210 --> 00:08:22,010
All four are veteran fliers, commanded by Chris Ferguson. Doug Hurley will be the pilot

112
00:08:22,030 --> 00:08:22,076
and Sandy Magnus and Rex Walheim are the mission specialists.

113
00:08:26,050 --> 00:08:27,740

CHRIS FERGUSON: We kept the scope of the mission fairly compact, you know, it's an MPLM

114
00:08:30,160 --> 00:08:30,426
resupply, logistics mission. There's one EVA, but that spacewalk is being done by the space

115
00:08:35,960 --> 00:08:40,160
station crew, so the scope is a little bit smaller as a result.

116
00:08:40,600 --> 00:08:41,683
NARRATOR: Because this is the final shuttle mission, its patch would carry extra meaning.

117
00:08:45,450 --> 00:08:46,356
The wife of Mission Specialist Rex Walheim came up with the design.

118
00:08:49,010 --> 00:08:51,649
Rex Walheim, Mission Specialist, STS-135: Well, we wanted to make it a celebration,

119
00:08:51,650 --> 00:08:54,246
we wanted to make it a happy patch that really encompasses the kind of history of the Space

120
00:08:55,120 --> 00:08:55,840
Shuttle Program. So in some respects it mirrors a little bit the STS-1 patch with the full

121
00:09:00,400 --> 00:09:00,586
shuttle on there and we wanted to also honor the whole NASA/contractor team, the whole team

122
00:09:06,280 --> 00:09:07,323
that has made the space shuttle possible and we did that by putting a portion of the NASA

123
00:09:11,170 --> 00:09:14,026
emblem in the middle with the swoosh on there and then we also wanted to signify that it as

124
00:09:14,380 --> 00:09:17,380
the last mission. We did that with the omega.

125
00:09:17,650 --> 00:09:18,720
NARRATOR: After 134 missions, the shuttle program has pushed the boundaries of what was

126
00:09:22,380 --> 00:09:25,246
possible for people to accomplish in space.

127
00:09:25,740 --> 00:09:28,473
Mike Leinbach, Shuttle Launch Director: The space program since its early days has been really

128
00:09:29,340 --> 00:09:29,960
something to point at as a piece of history, American history, and space shuttle for the last

129
00:09:34,920 --> 00:09:35,730
30 years has been the way we get American astronauts on to orbit and international astronauts

130
00:09:40,310 --> 00:09:45,576
with us. So it will be remembered as this part of American spaceflight history.

131
00:09:45,770 --> 00:09:48,369
Sandy Magnus, Mission Specialist, STS-135: To have a vehicle like the shuttle that launches as

132
00:09:48,370 --> 00:09:50,570
a rocket, lands as a heavy glider, and does all the different kind of functions on orbit that

133
00:09:52,370 --> 00:09:54,410
it has over the years, I think it's going to stand in the annals of history as a very unique,

134
00:09:56,530 --> 00:09:59,396
versatile, kind of a one-of-a-kind vehicle.

135
00:10:01,310 --> 00:10:02,826
Doug Hurley, Pilot, STS-135: The Hubble Space Telescope, the space station, I mean, just

136
00:10:05,660 --> 00:10:11,726
tremendous accomplishments. You know a winged vehicle that is able to come back to a runway

137
00:10:11,820 --> 00:10:12,140
developed in the 70s, I mean, it's just a tremendous technological feat even now.

138
00:10:16,900 --> 00:10:19,646

I don't think we're going to see a vehicle like it in the near future. And I'm just proud that

139
00:10:20,420 --> 00:10:22,553
I was one very small part of it.

140
00:10:25,170 --> 00:10:27,369
Rick Mastracchio, Three-time Shuttle Astronaut: I think people are going to look back on the

141
00:10:27,370 --> 00:10:28,240
space shuttle and think it was one of the most incredible vehicles built by mankind.

142
00:10:32,100 --> 00:10:36,633
CRIPPEN: It allowed us to fly into space in a fairly routine manner.

143
00:10:37,630 --> 00:10:43,763
It will be a long time before we see another vehicle nearly as capable as the space shuttle.

144
00:10:44,830 --> 00:10:46,400
FERGUSON: It'll be remembered, I think, for its pioneering, for its aerospace and just the