
SERVICING MISSION 4
HUBBLE SPACE TELESCOPE

1
00:00:05,749 --> 00:00:02,790
by the year 2002 hubble had done more

2
00:00:07,909 --> 00:00:05,759
than make a name for itself

3
00:00:11,749 --> 00:00:07,919
hubble had changed how we see the very

4
00:00:15,350 --> 00:00:13,589
galaxies became familiar neighborhoods

5
00:00:17,830 --> 00:00:15,360
to explore

6
00:00:22,150 --> 00:00:17,840
far off planets felt like old friends

7
00:00:23,830 --> 00:00:22,160
and nebulas a beautiful sight to behold

8
00:00:25,830 --> 00:00:23,840
and with servicing mission four coming

9
00:00:28,150 --> 00:00:25,840
up quickly the excitement was almost

10
00:00:29,589 --> 00:00:28,160
palpable for the new wonders hubble was

11
00:00:32,470 --> 00:00:29,599
about to uncover with its

12
00:00:36,389 --> 00:00:32,480
state-of-the-art upgrades

13
00:00:37,770 --> 00:00:36,399

that was until servicing mission 4 was

14
00:00:56,310 --> 00:00:37,780
canceled

15
00:00:58,389 --> 00:00:56,320
[Music]

16
00:01:00,709 --> 00:00:58,399
hubble's servicing mission 4 originally

17
00:01:02,549 --> 00:01:00,719
planned for the year 2004 was designed

18
00:01:04,420 --> 00:01:02,559
to bring hubble's scientific equipment

19
00:01:06,630 --> 00:01:04,430
to its peak performance

20
00:01:07,990 --> 00:01:06,640
[Music]

21
00:01:10,469 --> 00:01:08,000
this would ensure hubble would stay

22
00:01:15,150 --> 00:01:10,479
operational as long as possible since

23
00:01:20,870 --> 00:01:18,630
[Music]

24
00:01:22,870 --> 00:01:20,880
however in the early stages of preparing

25
00:01:25,280 --> 00:01:22,880
for this important mission

26
00:01:26,870 --> 00:01:25,290
disaster struck

27
00:01:29,510 --> 00:01:26,880
[Music]

28
00:01:32,310 --> 00:01:29,520
the loss of this valiant crew is

29
00:01:33,749 --> 00:01:32,320
something we will never

30
00:01:35,749 --> 00:01:33,759
be able to get over and certainly the

31
00:01:38,390 --> 00:01:35,759
families of all them

32
00:01:41,429 --> 00:01:38,400
we have assured we will do everything

33
00:01:43,270 --> 00:01:41,439
everything we can possibly do

34
00:01:48,550 --> 00:01:43,280
to guarantee that they work

35
00:01:53,109 --> 00:01:50,710
the world was shocked after the brave

36
00:01:55,670 --> 00:01:53,119
crew on space shuttle columbia was lost

37
00:01:59,590 --> 00:01:55,680
upon re-entry through earth's atmosphere

38
00:02:04,069 --> 00:02:01,990

soon after former nasa administrator

39
00:02:05,830 --> 00:02:04,079
sean o'keefe canceled hubble's final

40
00:02:07,590 --> 00:02:05,840
servicing mission over concerns about

41
00:02:09,480 --> 00:02:07,600
the safety of hubble servicing

42
00:02:14,790 --> 00:02:09,490
astronauts

43
00:02:18,790 --> 00:02:16,470
nasa tried to keep the spirit of hubble

44
00:02:20,949 --> 00:02:18,800
alive by switching to an entirely remote

45
00:02:22,630 --> 00:02:20,959
robotic servicing mission but concluded

46
00:02:24,550 --> 00:02:22,640
that it would be too expensive and would

47
00:02:26,630 --> 00:02:24,560
not be developed in time to be useful to

48
00:02:27,970 --> 00:02:26,640
hubble before it would become

49
00:02:31,350 --> 00:02:27,980
non-operational

50
00:02:31,360 --> 00:02:34,830
just under three years ago

51
00:02:40,150 --> 00:02:37,990
nasa had to announce

52
00:02:42,390 --> 00:02:40,160
a very troubling decision that decision

53
00:02:44,070 --> 00:02:42,400
being to cancel shuttle servicing

54
00:02:46,390 --> 00:02:44,080
mission 4

55
00:02:48,550 --> 00:02:46,400
for the hubble space telescope

56
00:02:50,470 --> 00:02:48,560
and today i'm here to announce a much

57
00:02:53,750 --> 00:02:50,480
more pleasant decision on behalf of the

58
00:02:58,869 --> 00:02:57,030
we are going to add a shuttle servicing

59
00:03:01,030 --> 00:02:58,879
mission to the hubble space telescope to

60
00:03:03,990 --> 00:03:01,040
the shuttle's manifest to be flown

61
00:03:05,990 --> 00:03:04,000
before it retires

62
00:03:08,309 --> 00:03:06,000
the news everybody was waiting for

63
00:03:20,229 --> 00:03:08,319

servicing mission 4 was reinstated and

64
00:03:20,239 --> 00:03:36,490
do

65
00:03:40,070 --> 00:03:37,990
[Music]

66
00:03:41,750 --> 00:03:40,080
it's a great day to go fly a great

67
00:03:42,900 --> 00:03:41,760
mission good luck godspeed we'll see you

68
00:03:48,070 --> 00:03:42,910
back

69
00:03:48,080 --> 00:03:54,140
is

70
00:03:54,150 --> 00:04:02,949
[Music]

71
00:04:07,350 --> 00:04:04,869
surfacing mission 4 was going to be one

72
00:04:09,350 --> 00:04:07,360
of hubble's most ambitious missions to

73
00:04:10,949 --> 00:04:09,360
date

74
00:04:13,110 --> 00:04:10,959
right away the astronauts of servicing

75
00:04:15,429 --> 00:04:13,120
mission 4 were tasked with installing a

76
00:04:18,789 --> 00:04:15,439
brand new instrument into hubble

77
00:04:20,870 --> 00:04:18,799
wide field camera three

78
00:04:22,790 --> 00:04:20,880
but this instrument didn't go in without

79
00:04:24,870 --> 00:04:22,800
a fight

80
00:04:27,690 --> 00:04:24,880
one singular bolt stood in the way of

81
00:04:28,770 --> 00:04:27,700
installing this instrument

82
00:04:33,270 --> 00:04:28,780
[Applause]

83
00:04:37,030 --> 00:04:35,030
this new panochromatic camera would

84
00:04:39,590 --> 00:04:37,040
allow astronomers to better understand

85
00:04:41,430 --> 00:04:39,600
galaxy evolution dark matter and dark

86
00:04:43,350 --> 00:04:41,440
energy

87
00:04:45,830 --> 00:04:43,360
next up to bat was installing another

88
00:04:48,390 --> 00:04:45,840

new instrument the cosmic origin

89
00:04:49,670 --> 00:04:48,400
spectrograph

90
00:04:51,749 --> 00:04:49,680
this would be the most sensitive

91
00:04:54,230 --> 00:04:51,759
spectrograph ever flown on hubble

92
00:04:56,629 --> 00:04:54,240
allowing us to peer even further into

93
00:04:58,310 --> 00:04:56,639
the ultraviolet spectrum

94
00:04:59,670 --> 00:04:58,320
but the punches hubble through weren't

95
00:05:02,310 --> 00:04:59,680
finished yet

96
00:05:03,990 --> 00:05:02,320
both the advanced camera for surveys acs

97
00:05:06,629 --> 00:05:04,000
and the space telescope imaging

98
00:05:08,950 --> 00:05:06,639
spectrograph stiz needed to be repaired

99
00:05:10,550 --> 00:05:08,960
following recent failures but these

100
00:05:13,110 --> 00:05:10,560
instruments weren't designed to be

101
00:05:14,550 --> 00:05:13,120
repaired in space

102
00:05:17,350 --> 00:05:14,560
astronauts had to open up both

103
00:05:18,469 --> 00:05:17,360
instruments and perform surgery to fix

104
00:05:20,390 --> 00:05:18,479
them

105
00:05:22,390 --> 00:05:20,400
the acs repair went well but when it

106
00:05:24,790 --> 00:05:22,400
came time to operate on stis hubble

107
00:05:27,189 --> 00:05:24,800
threw another hurdle in the way

108
00:05:30,150 --> 00:05:27,199
before astronauts could repair stis they

109
00:05:32,390 --> 00:05:30,160
needed to remove a handrail

110
00:05:33,670 --> 00:05:32,400
but a screw on that handrail got

111
00:05:37,270 --> 00:05:33,680
stripped

112
00:05:41,189 --> 00:05:38,950
after some quick thinking by engineers

113
00:05:43,110 --> 00:05:41,199

on the ground astronaut mike massimino

114
00:05:49,510 --> 00:05:43,120
was able to use brute force to pull the

115
00:05:53,749 --> 00:05:51,590
an unconventional yet effective method

116
00:05:57,350 --> 00:05:53,759
of getting the job done and the stis

117
00:05:58,790 --> 00:05:57,360
repair was a success

118
00:06:01,270 --> 00:05:58,800
not only that the astronauts of

119
00:06:03,670 --> 00:06:01,280
servicing mission 4 replaced gyroscopes

120
00:06:06,309 --> 00:06:03,680
batteries a failed computer installed

121
00:06:08,550 --> 00:06:06,319
new thermal blankets and a soft capture

122
00:06:11,029 --> 00:06:08,560
mechanism to allow for a future robotic

123
00:06:13,029 --> 00:06:11,039
spacecraft to dock with hubble and send

124
00:06:20,390 --> 00:06:13,039
it to its final resting place when its

125
00:06:29,110 --> 00:06:22,790
servicing mission 4 made hubble better

126
00:06:33,830 --> 00:06:31,029
and it wouldn't be without the crews of

127
00:06:35,350 --> 00:06:33,840
people in space and on the ground that

128
00:06:37,990 --> 00:06:35,360
allowed for that dream to become a

129
00:06:43,990 --> 00:06:41,189
and because of those people to this day

130
00:06:45,749 --> 00:06:44,000
hubble continues to expand our knowledge

131
00:06:49,909 --> 00:06:45,759
and wonder about the universe

132
00:06:54,390 --> 00:06:51,990
the hubble space telescope a piece of

133
00:06:56,390 --> 00:06:54,400
engineering and astronomical majesty

134
00:06:59,670 --> 00:06:56,400
once again released to uncover the