
SERVICING MISSION 2
HUBBLE SPACE TELESCOPE

1
00:00:05,030 --> 00:00:02,550
[Music]

2
00:00:06,630 --> 00:00:05,040
and we have liftoff after the first

3
00:00:08,029 --> 00:00:06,640
servicing mission to the hubble space

4
00:00:08,720 --> 00:00:08,039
telescope

5
00:00:10,549 --> 00:00:08,730
[Applause]

6
00:00:12,950 --> 00:00:10,559
[Music]

7
00:00:18,550 --> 00:00:12,960
hubble amazed us with its ability to see

8
00:00:22,550 --> 00:00:20,310
but hubble can also see things that our

9
00:00:23,990 --> 00:00:22,560
eyes don't naturally see even if we were

10
00:00:25,670 --> 00:00:24,000
up close

11
00:00:27,509 --> 00:00:25,680
we would actually see something that

12
00:00:29,589 --> 00:00:27,519
looks more like this

13
00:00:31,589 --> 00:00:29,599

but how can we see this then when our

14
00:00:34,229 --> 00:00:31,599
eyes would actually see something that

15
00:00:36,549 --> 00:00:34,239
mostly resembles that

16
00:00:38,760 --> 00:00:36,559
and the answer to that question lies

17
00:00:39,310 --> 00:00:38,770
within servicing mission two

18
00:00:40,549 --> 00:00:39,320
[Applause]

19
00:00:44,560 --> 00:00:40,559
[Music]

20
00:00:53,270 --> 00:00:44,570
liftoff discovery now on its way

21
00:00:54,549 --> 00:00:53,280
[Music]

22
00:00:56,150 --> 00:00:54,559
when hubble was first launched into

23
00:01:01,029 --> 00:00:56,160
orbit much of the technology that

24
00:01:05,670 --> 00:01:03,590
that's what makes hubble so unique

25
00:01:08,070 --> 00:01:05,680
over its lifetime hubble was able to be

26
00:01:09,910 --> 00:01:08,080
serviced five times

27
00:01:12,070 --> 00:01:09,920
allowing us to fix parts that may have

28
00:01:13,910 --> 00:01:12,080
been worn out and add new instruments

29
00:01:19,350 --> 00:01:13,920
that have been specifically crafted to

30
00:01:24,469 --> 00:01:22,789
now up until servicing mission 2 in 1997

31
00:01:26,390 --> 00:01:24,479
the hubble space telescope could only

32
00:01:28,950 --> 00:01:26,400
capture light within the visible to

33
00:01:30,710 --> 00:01:28,960
ultraviolet spectrum

34
00:01:33,109 --> 00:01:30,720
and even though our eyes can only see

35
00:01:38,069 --> 00:01:33,119
within the visible range nasa was after

36
00:01:41,830 --> 00:01:39,670
by widening the range of light that

37
00:01:43,429 --> 00:01:41,840
hubble is able to capture astronomers

38
00:01:48,310 --> 00:01:43,439

could see into distinctly different

39
00:01:52,630 --> 00:01:50,069
this is because a picture is worth a

40
00:01:55,670 --> 00:01:52,640
thousand words but the light that formed

41
00:01:57,910 --> 00:01:55,680
that picture also has a story to tell

42
00:02:00,789 --> 00:01:57,920
and here's where spectroscopy comes into

43
00:02:02,469 --> 00:02:00,799
the narrative of that story

44
00:02:04,310 --> 00:02:02,479
spectroscopy is a technique that

45
00:02:07,350 --> 00:02:04,320
scientists use to separate light into

46
00:02:08,949 --> 00:02:07,360
its component colors or wavelengths

47
00:02:11,190 --> 00:02:08,959
and by separating light into its

48
00:02:15,190 --> 00:02:11,200
components we are able to unpack greater

49
00:02:19,430 --> 00:02:17,350
so nasa constructed the necessary

50
00:02:21,110 --> 00:02:19,440
mechanisms needed to capture a wider

51
00:02:22,869 --> 00:02:21,120
range of light

52
00:02:24,550 --> 00:02:22,879
they spent years coming over every

53
00:02:26,229 --> 00:02:24,560
detail of these new instruments and

54
00:02:27,910 --> 00:02:26,239
trained a team of astronauts the

55
00:02:29,590 --> 00:02:27,920
techniques needed to install them

56
00:02:30,869 --> 00:02:29,600
properly into hubble

57
00:02:32,949 --> 00:02:30,879
[Music]

58
00:02:36,470 --> 00:02:32,959
the purpose of today is for the

59
00:02:40,309 --> 00:02:36,480
crew of the second servicing mission for

60
00:02:42,869 --> 00:02:40,319
hubble to get familiar with installing

61
00:02:44,869 --> 00:02:42,879
a science instrument into the telescope

62
00:02:47,110 --> 00:02:44,879
after the proper preparation of the new

63
00:02:48,869 --> 00:02:47,120

instruments all the components of

64
00:02:55,030 --> 00:02:48,879
servicing mission 2 were ready for

65
00:03:00,149 --> 00:02:57,910
ignition and liftoff discovery now on

66
00:03:01,830 --> 00:03:00,159
its way to service nasa's hubble space

67
00:03:03,830 --> 00:03:01,840
telescope

68
00:03:06,229 --> 00:03:03,840
aboard discovery the is now in a heads

69
00:03:18,550 --> 00:03:06,239
down position on course for a 28.5

70
00:03:24,710 --> 00:03:20,630
good morning discovery it's today to go

71
00:03:28,149 --> 00:03:26,949
hey good morning chris we're ready to do

72
00:03:29,910 --> 00:03:28,159
that

73
00:03:32,149 --> 00:03:29,920
during this mission the team of seven

74
00:03:35,910 --> 00:03:32,159
astronauts installed the space telescope

75
00:03:37,910 --> 00:03:35,920
imaging spectrograph or stis to hubble

76
00:03:40,390 --> 00:03:37,920
allowing us to separate ultraviolet and

77
00:03:42,229 --> 00:03:40,400
visible light into its components giving

78
00:03:43,750 --> 00:03:42,239
scientists critical diagnostic

79
00:03:46,869 --> 00:03:43,760
information about an object's

80
00:03:49,990 --> 00:03:46,879
composition temperature motion and other

81
00:03:52,070 --> 00:03:50,000
physical and chemical properties

82
00:03:54,630 --> 00:03:52,080
also as this hubble was able to capture

83
00:03:56,550 --> 00:03:54,640
in a single exposure a spectral region

84
00:03:58,949 --> 00:03:56,560
30 times wider than previous

85
00:04:00,630 --> 00:03:58,959
spectrographs

86
00:04:02,949 --> 00:04:00,640
now questions surrounding the study of

87
00:04:04,550 --> 00:04:02,959
massive black holes stellar flares the

88
00:04:06,470 --> 00:04:04,560

evolution of the universe and

89
00:04:08,869 --> 00:04:06,480
distribution of matter could now be

90
00:04:11,830 --> 00:04:08,879
studied in fuller view

91
00:04:13,830 --> 00:04:11,840
but nasa did not stop there

92
00:04:16,469 --> 00:04:13,840
they also installed the near-infrared

93
00:04:18,789 --> 00:04:16,479
camera and multi-object spectrometer or

94
00:04:21,909 --> 00:04:18,799
nikmas which allowed hubble to see into

95
00:04:24,469 --> 00:04:21,919
the universe by infrared light

96
00:04:26,950 --> 00:04:24,479
we can now tackle questions like how do

97
00:04:28,710 --> 00:04:26,960
stars form how many stars have planetary

98
00:04:31,830 --> 00:04:28,720
systems or

99
00:04:33,749 --> 00:04:31,840
how do galaxies form and evolve

100
00:04:35,670 --> 00:04:33,759
additionally the astronauts of servicing

101
00:04:38,150 --> 00:04:35,680
mission 2 refurbished defined guidance

102
00:04:39,830 --> 00:04:38,160
sensor and gyroscopes all of which help

103
00:04:41,830 --> 00:04:39,840
point the telescope they repaired

104
00:04:44,150 --> 00:04:41,840
failing thermal blankets which regulate

105
00:04:46,310 --> 00:04:44,160
hubble's temperature added a better data

106
00:04:48,870 --> 00:04:46,320
recorder and data interface unit which

107
00:04:50,710 --> 00:04:48,880
all help manage hubble's data intake and

108
00:04:59,430 --> 00:04:50,720
replace the electronics that drive

109
00:05:03,909 --> 00:05:01,510
now more than ever we were able to see

110
00:05:06,310 --> 00:05:03,919
into the universe in a rainbow of colors

111
00:05:11,270 --> 00:05:06,320
that were only a dream in the early

112
00:05:14,950 --> 00:05:13,029
servicing mission 2 went down in the

113
00:05:17,029 --> 00:05:14,960

history books by making the hubble space

114
00:05:26,150 --> 00:05:17,039
telescope more scientifically powerful

115
00:05:29,110 --> 00:05:27,590
proof that you all have done a great job

116
00:05:30,790 --> 00:05:29,120
so many thanks to all the people in all

117
00:05:32,790 --> 00:05:30,800
the other ground locations supporting

118
00:05:34,310 --> 00:05:32,800
this mission before we understand the

119
00:05:37,590 --> 00:05:34,320
sacrifices you made to make sure this