Hubble Memorable Moments

1
00:00:00,000 --> 00:00:04,210
>>KATRINA: The Hubble Space Telescope, after

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00:00:04,210 --> 00:00:08,420
over a decade of development, was finally launched on Tuesday,

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00:00:08,420 --> 00:00:12,610
April 24th, 1990, with the Space Shuttle crew of

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00:00:12,610 --> 00:00:16,820
STS-31. The next several days would include a lot of long, stressful hours

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00:00:16,820 --> 00:00:21,020
for the Hubble operations team at NASA's Goddard Space Flight Center. Problems kept

6
00:00:21,020 --> 00:00:25,220
popping up, with the pressure of the entire world watching. But,

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00:00:25,220 --> 00:00:29,430
even under pressure, engineers are capable of some pretty creative problem-solving.

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00:00:29,430 --> 00:00:33,610
[music]

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00:00:33,610 --> 00:00:37,790
[shimmering music] >>JOHN: The week that Hubble deployed

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00:00:37,790 --> 00:00:41,820
was a very intense week for all of us here. >>DAVE: NASA had beat the drums

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00:00:41,820 --> 00:00:45,880
pretty loudly for HST, so everybody was watching.

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00:00:45,880 --> 00:00:50,070
Everybody was paying attention. [digital beeps]

13
00:00:50,070 --> 00:00:54,260

>>LARRY: Yeah on a Friday morning at about 4:30,

14
00:00:54,260 --> 00:00:58,340
we noticed that we were getting what we call "safemode counts".

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00:00:58,340 --> 00:01:02,520
>>JOHN: There were high torques developing in the high-gain antenna that we didn't

16
00:01:02,520 --> 00:01:06,690
expect. >>LARRY: The high-gain antennas are our main

17
00:01:06,690 --> 00:01:10,900
way to communicate with the ground, to get our science data there. And we have two

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00:01:10,900 --> 00:01:15,080
high-gain antennas, one on each side. >>DAVE: The spacecraft had noticed that

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00:01:15,080 --> 00:01:19,270
when it tried to move one of the antennas, there was resistance, and

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00:01:19,270 --> 00:01:23,460
the spacecraft was programmed such that if it felt continued resistance,

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00:01:23,460 --> 00:01:27,640
it would just declare sort of a "I'm not going to go any further with this."

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00:01:27,640 --> 00:01:31,820
>>LARRY: On Saturday, we had gotten a tiger team together and looked at the

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00:01:31,820 --> 00:01:36,000
high torques we had seen on the high-gain antenna on Friday. About 2:00 we

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00:01:36,000 --> 00:01:40,180
turned it back on again, tried to move it again, and immediately we saw we were still

25
00:01:40,180 --> 00:01:44,370
getting high torques on there. >>JOHN: When I walked into the building on Sunday, after

26
00:01:44,370 --> 00:01:48,550
having gotten a little bit of sleep, operations of the Hubble had

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00:01:48,550 --> 00:01:52,750
basically stopped. >>DAVE: The managers put all of the technical people in a room

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00:01:52,750 --> 00:01:56,940
and said, "Figure this out." Today, you would bring it up on a screen

29
00:01:56,940 --> 00:02:01,090
and you would move the thing around and you would see what's going on. But these were

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00:02:01,090 --> 00:02:05,270
much more primitive days. >>JOHN: So I was with my hands trying to figure out what

31
00:02:05,270 --> 00:02:09,450
the various positions of the high-gain antenna motors

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00:02:09,450 --> 00:02:13,640
were. >>DAVE: We were able to find some loose-leaf binder sort of things

33
00:02:13,640 --> 00:02:17,730
with a lot of photos of the high-gain antenna. >>JOHN: I saw this cable loop

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00:02:17,730 --> 00:02:21,920
and it appeared to me to be at an odd position. Somewhere along the line, I

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00:02:21,920 --> 00:02:26,110
just, I said probably half jokingly, "Boy, if I had a set of Tinkertoys,

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00:02:26,110 --> 00:02:30,300
I could build a little model of this and show you guys what's going on."

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00:02:30,300 --> 00:02:34,470
>>DAVE: You're sitting in a room with the highest power of people in the business,

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00:02:34,470 --> 00:02:38,650

and you're proposing to go get a child's toy to help solve the problem.

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00:02:38,650 --> 00:02:42,830
>>JOHN: Dave Skillman pulled me aside. He looked me straight in the face

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00:02:42,830 --> 00:02:47,010
and he said, "Were you serious about that?" >>DAVE: I just kind of let myself out of the room

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00:02:47,010 --> 00:02:51,200
and drove to the nearby Toys 'R' Us.

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00:02:51,200 --> 00:02:55,380
People were asking me, "Can I help you?" and I'm going, "Not easily...

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00:02:55,380 --> 00:02:59,450
This is not really the spacecraft aisle." >>JOHN: And about

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00:02:59,450 --> 00:03:03,640
an hour later, he came back. And I sat down at the table,

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00:03:03,640 --> 00:03:07,670
he sat down next to me, and I put together a

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00:03:07,670 --> 00:03:11,860
little working model of the high-gain antenna. And then right

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00:03:11,860 --> 00:03:16,040
away, when I moved the two gimbals to the positions that

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00:03:16,040 --> 00:03:20,220
they had been at when the torque occurred, sure enough, this

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00:03:20,220 --> 00:03:24,400
little Tinkertoy model of a counterweight was right

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00:03:24,400 --> 00:03:28,590
in contact with this electrical extension cord. >>LARRY: It was amazing how it actually

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00:03:28,590 --> 00:03:32,790
allowed us to visualize what's going on out there in space.

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00:03:32,790 --> 00:03:36,830
>>JOHN: This area of high torque was really a relatively small piece

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00:03:36,830 --> 00:03:40,880
of the operational area of the high-gain. As long as we stayed away from that

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00:03:40,880 --> 00:03:45,000
obstruction, there was a whole, you know, huge range of motion of the

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00:03:45,000 --> 00:03:49,190
antenna that we would be able to operate. >>DAVE: The model was able to convince the

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00:03:49,190 --> 00:03:53,380
politicians and the managers that we did understand the problem.

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00:03:53,380 --> 00:03:57,430
And then the technical guys had figured out what we needed to do to fix the problem.

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00:03:57,430 --> 00:04:01,550
>>JOHN: 9:00 that night, Sunday night, we went into the control room,

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00:04:01,550 --> 00:04:05,730
and the folks in command sent the commands up.

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00:04:05,730 --> 00:04:09,910
>>LARRY: And immediately we saw those torque levels go down, when we turned it on and

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00:04:09,910 --> 00:04:14,080
started to back it away. And we all breathed a big sigh of relief.

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00:04:14,080 --> 00:04:18,280
We were saying, "okay, we didn't break it, we think it's still operational." If we hadn't had use

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00:04:18,280 --> 00:04:22,450

of the high-gain, that would have been a big impact to Hubble.

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00:04:22,450 --> 00:04:26,620
[transitioning music] >>KATRINA: With the telescope now

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00:04:26,620 --> 00:04:30,720
fully deployed, the Hubble operations team could finally catch their breath.

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00:04:30,720 --> 00:04:34,900
And then, a couple months later, people discovered that devastating

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00:04:34,900 --> 00:04:39,120
problem with Hubble's flawed primary mirror, a huge blow to the project.

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00:04:39,120 --> 00:04:43,300
But incredibly, the Hubble team worked through it and found a solution to that problem

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00:04:43,300 --> 00:04:47,480
and to many more obstacles over the next 25 years. So, stay tuned

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00:04:47,480 --> 00:04:51,680
for more Hubble Memorable Moments.