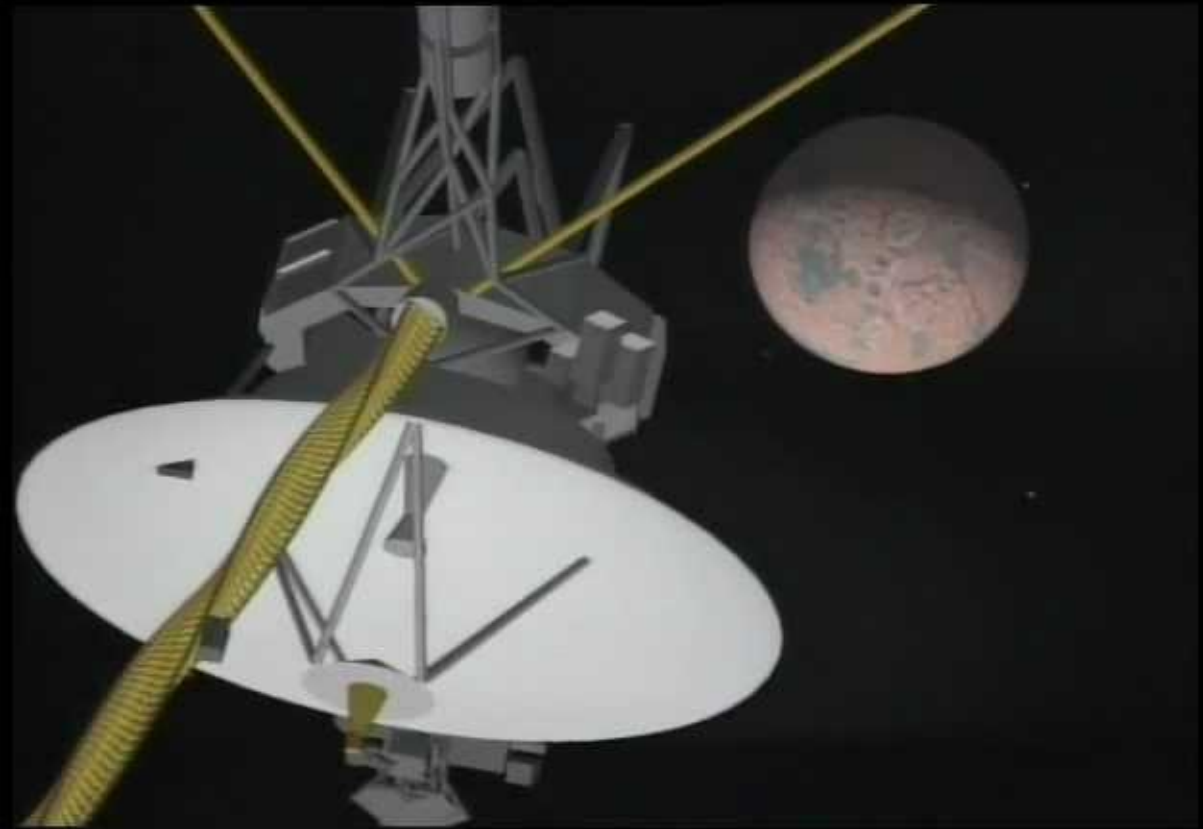

1
00:00:12,200 --> 00:00:09,410
it's been traveling for nearly 12 years

2
00:00:22,040 --> 00:00:12,210
it has already logged more than 4

3
00:00:24,109 --> 00:00:22,050
billion miles in its lifetime it's been

4
00:00:27,890 --> 00:00:24,119
to places humans had once only dreamed

5
00:00:30,609 --> 00:00:27,900
about and on August twenty-fourth 1989

6
00:00:41,389 --> 00:00:30,619
at nine p.m. pacific daylight time

7
00:00:47,310 --> 00:00:44,310
it will become the first spacecraft to

8
00:00:52,189 --> 00:00:47,320
fly by Neptune a planet that orbits the

9
00:01:00,660 --> 00:00:56,460
launched in 1977 Voyager 1 and 2 have

10
00:01:03,570 --> 00:01:00,670
taken us to Jupiter and Saturn when

11
00:01:06,120 --> 00:01:03,580
Voyager 1 flew past the large moon Titan

12
00:01:08,070 --> 00:01:06,130
and behind Saturn's rings its flight

13
00:01:09,840 --> 00:01:08,080

path was bent northward and the

14
00:01:12,800 --> 00:01:09,850
spacecraft was sent out of the ecliptic

15
00:01:15,480 --> 00:01:12,810
plane and on toward interstellar space

16
00:01:17,190 --> 00:01:15,490
Voyager 2 is on a flight path it takes

17
00:01:19,560 --> 00:01:17,200
advantage of a rare geometric

18
00:01:22,170 --> 00:01:19,570
positioning of the outer planets this

19
00:01:24,450 --> 00:01:22,180
allows Voyager 2 to use the gravity of

20
00:01:26,580 --> 00:01:24,460
the planets it's encountered to boost it

21
00:01:32,010 --> 00:01:26,590
from one to another without onboard

22
00:01:34,590 --> 00:01:32,020
propulsion Neptune is invisible to the

23
00:01:36,450 --> 00:01:34,600
naked eye even our biggest telescopes

24
00:01:39,690 --> 00:01:36,460
can see only broad features of the

25
00:01:42,450 --> 00:01:39,700
planet early pictures sent back from

26
00:01:44,669 --> 00:01:42,460
Voyager already show cloud features and

27
00:01:49,020 --> 00:01:44,679
a dark band of clouds and circling the

28
00:01:51,719 --> 00:01:49,030
southern pole Neptune's diameter is

29
00:01:53,969 --> 00:01:51,729
about four times the size of Earth it's

30
00:01:57,690 --> 00:01:53,979
blue green color comes from atmospheric

31
00:02:00,240 --> 00:01:57,700
methane which absorbs red light in orbit

32
00:02:02,460 --> 00:02:00,250
around Neptune our ring arcs and one of

33
00:02:07,620 --> 00:02:02,470
the larger and most interesting moons in

34
00:02:10,889 --> 00:02:07,630
the solar system Triton at Voyager tues

35
00:02:13,830 --> 00:02:10,899
closest approach it will pass just 3,000

36
00:02:16,080 --> 00:02:13,840
miles from Neptune's cloud tops that's

37
00:02:19,470 --> 00:02:16,090
closer than Voyager 2 has come to any

38
00:02:22,020 --> 00:02:19,480

other planet a few days before the

39
00:02:24,510 --> 00:02:22,030
spacecraft arrives at Neptune engineers

40
00:02:27,960 --> 00:02:24,520
will fine-tune voyagers flight path over

41
00:02:30,240 --> 00:02:27,970
Neptune's North Pole Voyager will be

42
00:02:32,100 --> 00:02:30,250
able to detect any Neptunian magnetic

43
00:02:35,900 --> 00:02:32,110
field and is likely to pass through the

44
00:02:38,400 --> 00:02:35,910
region where the Northern Lights form

45
00:02:40,770 --> 00:02:38,410
despite Neptune's greater distance from

46
00:02:43,830 --> 00:02:40,780
the Sun its temperature is the same as

47
00:02:46,650 --> 00:02:43,840
that of Uranus for it to be so warm and

48
00:02:51,990 --> 00:02:46,660
yet so far away Neptune must generate

49
00:02:54,290 --> 00:02:52,000
some internal heat of its own another of

50
00:02:57,090 --> 00:02:54,300
Neptune's mysteries is it's moon Triton

51
00:02:59,790 --> 00:02:57,100
with a presumed atmosphere of methane

52
00:03:00,870 --> 00:02:59,800
and possibly nitrogen Triton is expected

53
00:03:03,390 --> 00:03:00,880
to be one of the most fascinating

54
00:03:07,290 --> 00:03:03,400
objects and counted in Voyager tues

55
00:03:10,380 --> 00:03:07,300
entire journey because Neptune is so far

56
00:03:12,300 --> 00:03:10,390
away radio data from Voyager traveling

57
00:03:16,320 --> 00:03:12,310
at the speed of light will take four

58
00:03:18,300 --> 00:03:16,330
hours and six minutes to reach Earth the

59
00:03:20,910 --> 00:03:18,310
signals are received through the Deep

60
00:03:22,740 --> 00:03:20,920
Space Network a global spacecraft

61
00:03:24,180 --> 00:03:22,750
tracking and communication system

62
00:03:28,140 --> 00:03:24,190
operated by the Jet Propulsion

63
00:03:30,000 --> 00:03:28,150

Laboratory for NASA to provide

64
00:03:33,180 --> 00:03:30,010
continuous two-way contact with the

65
00:03:35,340 --> 00:03:33,190
spacecraft DSN antenna stations are

66
00:03:39,960 --> 00:03:35,350
strategically located in California's

67
00:03:43,260 --> 00:03:39,970
Mojave Desert near Madrid Spain and near

68
00:03:45,390 --> 00:03:43,270
Canberra Australia the father away

69
00:03:48,540 --> 00:03:45,400
Voyager goes the more difficult it is to

70
00:03:51,360 --> 00:03:48,550
pick up its weak signal to make up for

71
00:03:53,550 --> 00:03:51,370
this the DSN antennas have been enlarged

72
00:03:55,460 --> 00:03:53,560
and are now able to collect more and

73
00:03:58,140 --> 00:03:55,470
higher quality data from the spacecraft

74
00:03:59,970 --> 00:03:58,150
the Parkes radio Observatory in

75
00:04:02,340 --> 00:03:59,980
Australia and the National Radio

76
00:04:05,730 --> 00:04:02,350
Astronomy Observatory's Very Large Array

77
00:04:07,920 --> 00:04:05,740
in New Mexico will join the DSN antennas

78
00:04:11,070 --> 00:04:07,930
to provide for additional receiving

79
00:04:13,170 --> 00:04:11,080
power the asudar tracking station in

80
00:04:16,320 --> 00:04:13,180
japan will help conduct radio science

81
00:04:18,659 --> 00:04:16,330
experiments with the encounter of

82
00:04:20,820 --> 00:04:18,669
Neptune Voyager 2 will complete its

83
00:04:29,220 --> 00:04:20,830
grand tour of the four giant outer

84
00:04:34,930 --> 00:04:31,960
the spacecraft is expected to continue

85
00:04:37,990 --> 00:04:34,940
to send back valuable data well into the

86
00:04:40,540 --> 00:04:38,000
21st century as voyager 2 reaches for

87
00:04:44,920 --> 00:04:40,550
the edge of our solar system and enters

88
00:04:48,070 --> 00:04:44,930

interstellar space once there Voyager

89
00:04:50,940 --> 00:04:48,080
will again stretch our imagination as it