
mars

1
00:00:10,879 --> 00:00:08,780
hi I'm Ashwin Vasavada the deputy

2
00:00:12,709 --> 00:00:10,889
project scientist for the Mars Science

3
00:00:15,279 --> 00:00:12,719
Laboratory mission and it's Curiosity

4
00:00:18,140 --> 00:00:15,289
rover so a lot of people wonder why

5
00:00:19,730 --> 00:00:18,150
curiosity doesn't have solar panels like

6
00:00:21,769 --> 00:00:19,740
the Mars exploration Rovers Spirit and

7
00:00:23,960 --> 00:00:21,779
Opportunity the Mars exploration Rovers

8
00:00:26,029 --> 00:00:23,970
often found themselves short on power as

9
00:00:27,560 --> 00:00:26,039
dust settled on their solar panels this

10
00:00:30,109 --> 00:00:27,570
was especially a problem in the short

11
00:00:31,820 --> 00:00:30,119
days of winter we need a good strong and

12
00:00:33,560 --> 00:00:31,830
reliable source of power to keep

13
00:00:36,680 --> 00:00:33,570

curiosity going for over two years on

14
00:00:38,660 --> 00:00:36,690
Mars curiosity is two times bigger five

15
00:00:40,520 --> 00:00:38,670
times heavier and has 15 times the

16
00:00:42,470 --> 00:00:40,530
weight of scientific equipment relative

17
00:00:44,810 --> 00:00:42,480
to Spirit and Opportunity like those

18
00:00:46,840 --> 00:00:44,820
Rovers Curiosity surveys the landscape

19
00:00:49,160 --> 00:00:46,850
and examines rocks up close

20
00:00:51,319 --> 00:00:49,170
curiosity scientific mission involves

21
00:00:54,380 --> 00:00:51,329
driving around its landing site perhaps

22
00:00:56,209 --> 00:00:54,390
up to 15 or 20 miles collecting samples

23
00:00:58,189 --> 00:00:56,219
of rocks and soils with a big jack

24
00:01:00,319 --> 00:00:58,199
hammer drill located on the end of a six

25
00:01:02,060 --> 00:01:00,329
foot robotic arm those samples have

26
00:01:04,160 --> 00:01:02,070
delivered to the rover and analyzed with

27
00:01:07,160 --> 00:01:04,170
some very sophisticated and power-hungry

28
00:01:09,830 --> 00:01:07,170
analytical laboratory instruments that's

29
00:01:10,780 --> 00:01:09,840
where the MM RTG comes in the

30
00:01:13,550 --> 00:01:10,790
multi-mission radioisotope

31
00:01:15,289 --> 00:01:13,560
thermoelectric generator is a power

32
00:01:17,030 --> 00:01:15,299
source that we've used for years to

33
00:01:18,950 --> 00:01:17,040
power a spacecraft that have gone to the

34
00:01:21,530 --> 00:01:18,960
outer planets and even the Apollo

35
00:01:23,060 --> 00:01:21,540
missions use it on the moon behind me

36
00:01:25,100 --> 00:01:23,070
you can see a full scale model of

37
00:01:27,590 --> 00:01:25,110
curiosity including the generator in the

38
00:01:29,870 --> 00:01:27,600

back on this half scale model of the

39
00:01:31,550 --> 00:01:29,880
generator you can see what's inside the

40
00:01:34,550 --> 00:01:31,560
generator contains a specially produced

41
00:01:36,260 --> 00:01:34,560
form of plutonium dioxide the natural

42
00:01:38,660 --> 00:01:36,270
decay of this radioisotope gives off

43
00:01:40,910 --> 00:01:38,670
heat which these thermocouples can turn

44
00:01:42,920 --> 00:01:40,920
into electricity the generator provides

45
00:01:44,600 --> 00:01:42,930
both electrical power and heat to the

46
00:01:46,789 --> 00:01:44,610
rover about a hundred watts of

47
00:01:49,700 --> 00:01:46,799
electrical power is used to continuously

48
00:01:51,469 --> 00:01:49,710
charge the rover's battery also heat can

49
00:01:53,600 --> 00:01:51,479
be pumped off of the generator using

50
00:01:55,389 --> 00:01:53,610
pipes to keep the rover's insides warm

51
00:01:58,190 --> 00:01:55,399
including the scientific instruments

52
00:01:59,749 --> 00:01:58,200
with curiosity's generator there's a

53
00:02:00,970 --> 00:01:59,759
guaranteed way of charging the battery

54
00:02:03,400 --> 00:02:00,980
year-round in all

55
00:02:04,630 --> 00:02:03,410
sorts of conditions curiosity's

56
00:02:05,950 --> 00:02:04,640
generator was developed by the

57
00:02:07,480 --> 00:02:05,960
Department of Energy and will be

58
00:02:09,130 --> 00:02:07,490
installed on the rover just a few days

59
00:02:10,570 --> 00:02:09,140
before launch but to make sure

60
00:02:12,490 --> 00:02:10,580
everything works together properly the

61
00:02:14,770 --> 00:02:12,500
engineers installed the actual generator

62
00:02:16,240 --> 00:02:14,780
on the rover for the first time the blue

63
00:02:17,500 --> 00:02:16,250

light that you see was just additional

64
00:02:19,570 --> 00:02:17,510
lighting to help them make sure they

65
00:02:21,340 --> 00:02:19,580
could see what they were doing the

66
00:02:22,960 --> 00:02:21,350
Curiosity rover and a spacecraft that

67
00:02:24,700 --> 00:02:22,970
will take it to Mars are currently in

68
00:02:26,590 --> 00:02:24,710
Florida undergoing its final

69
00:02:28,600 --> 00:02:26,600
preparations for launch everything's

70
00:02:30,100 --> 00:02:28,610
going well and all of us on the science

71
00:02:32,170 --> 00:02:30,110
team can't wait for its launch later

72
00:02:34,600 --> 00:02:32,180
this year and its arrival to Mars next