1
00:00:20,750 --> 00:00:18,260
five four three two one liftoff and the

2
00:00:26,210 --> 00:00:20,760
Titan 4 with its more spacecraft display

3
00:00:33,650 --> 00:00:29,870
in the late 1990s NASA is planning to

4
00:00:36,200 --> 00:00:33,660
conduct an unmanned mission to Mars its

5
00:00:38,690 --> 00:00:36,210
purpose is to collect soil samples for

6
00:00:42,290 --> 00:00:38,700
return to earth and to perform other

7
00:00:44,960 --> 00:00:42,300
scientific experiments this video

8
00:00:48,920 --> 00:00:44,970
depicts one possible scenario for the

9
00:00:53,150 --> 00:00:48,930
three-year mission two payloads are

10
00:00:56,630 --> 00:00:53,160
launched aboard to Titan for rockets

11
00:00:59,090 --> 00:00:56,640
upon arrival at Mars an arrow capture

12
00:01:02,270 --> 00:00:59,100
maneuver is used to place each payload

13
00:01:04,700 --> 00:01:02,280

into an elliptical orbit one payload

14
00:01:08,720 --> 00:01:04,710
contains a Mars rover and a Mars orbiter

15
00:01:10,850 --> 00:01:08,730
with an earth return vehicle the other

16
00:01:12,880 --> 00:01:10,860
payload contains a Mars ascent vehicle

17
00:01:15,870 --> 00:01:12,890
and an imaging and communications

18
00:01:19,499 --> 00:01:15,880
orbiter

19
00:01:21,840 --> 00:01:19,509
shortly after a circularization burn the

20
00:01:25,109 --> 00:01:21,850
asset vehicle separates from the imaging

21
00:01:28,109 --> 00:01:25,119
and communications orbiter performs an

22
00:01:30,469 --> 00:01:28,119
entry maneuver and descends to the

23
00:01:34,080 --> 00:01:30,479
Martian surface

24
00:01:37,499 --> 00:01:34,090
similar to the SM vehicle the Mars rover

25
00:01:40,289 --> 00:01:37,509
lands equipped with artificial

26
00:01:43,050 --> 00:01:40,299
intelligence and a stereo video camera

27
00:01:47,609 --> 00:01:43,060
it spends a year exploring the Martian

28
00:01:50,339 --> 00:01:47,619
surface during this time it transmits

29
00:01:56,270 --> 00:01:50,349
digital video images back to earth and

30
00:02:01,910 --> 00:01:58,810
when sampling operations are complete

31
00:02:06,350 --> 00:02:01,920
the rover is instructed to rendezvous

32
00:02:12,080 --> 00:02:06,360
with the a sent vehicle once there the

33
00:02:14,150 --> 00:02:12,090
sample canister is transferred the

34
00:02:17,150 --> 00:02:14,160
ascent vehicle then rotates to the

35
00:02:19,340 --> 00:02:17,160
vertical launch position and the rover

36
00:02:25,760 --> 00:02:19,350
departs to conduct further scientific

37
00:02:27,590 --> 00:02:25,770
studies ignition occurs and the boost

38
00:02:32,030 --> 00:02:27,600

module separates from its launch

39
00:02:37,550 --> 00:02:35,360
after an attitude maneuver the vehicle

40
00:02:41,720 --> 00:02:37,560
is placed in the same orbit as the Mars

41
00:02:47,830 --> 00:02:41,730
orbiter a radar scan is performed to

42
00:02:53,539 --> 00:02:51,530
upon acquisition of signals the orbiter

43
00:02:58,910 --> 00:02:53,549
performs a series of maneuvers to

44
00:03:01,429 --> 00:02:58,920
rendezvous and dock a docking complete

45
00:03:07,630 --> 00:03:01,439
signal initiates transfer of the sample

46
00:03:12,580 --> 00:03:10,900
the ascent vehicle then undocks to allow

47
00:03:18,059 --> 00:03:12,590
separation of the earth return vehicle

48
00:03:27,210 --> 00:03:21,250
the return vehicle performs an injection

49
00:03:33,490 --> 00:03:30,729
when thrust terminates the engines are

50
00:03:40,290 --> 00:03:33,500
jettisoned and solar arrays are deployed

51
00:03:47,759 --> 00:03:43,570
upon arrival at Earth the return vehicle

52
00:03:51,039 --> 00:03:47,769
deploys the earth aerocapture capsule

53
00:03:53,910 --> 00:03:51,049
during aerocapture friction from the

54
00:03:56,080 --> 00:03:53,920
Earth's atmosphere slows the capsule

55
00:03:59,530 --> 00:03:56,090
after aerocapture

56
00:04:01,630 --> 00:03:59,540
the aeroshell is detached and a burn is

57
00:04:06,610 --> 00:04:01,640
performed to place the vehicle in the

58
00:04:11,840 --> 00:04:09,530
the return vehicle is retrieved by a

59
00:04:15,320 --> 00:04:11,850
space station based orbital maneuvering

60
00:04:17,810 --> 00:04:15,330
vehicle the sample canister is

61
00:04:20,420 --> 00:04:17,820
quarantined at the station until it is