

The Walt Disney Company

**Master English Dialogue List
FINAL**

"ROVING MARS"

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Prepared By:

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**"ROVING MARS"
FINAL DIALOGUE LIST**

PAGE 1

LABORATORY: START MEASURING 0.00 AT START MARK

CHARACTER

DIALOGUE

FOOTAGE

PAUL NEWMAN

(voice over) Space exploration began with dreaming. Thousands of years of humans staring into the heavens...

01:00:38.04
(dissolve)

PAUL NEWMAN

(voice over) ...and wondering, "How did this begin? What else is out there?" The earliest answers were given in myth and poetry.

01:00:48.04
(dissolve)

PAUL NEWMAN

(voice over) Now, they are sought by space-age technology. And while each mission increases our knowledge, it also...

01:00:55.24
(dissolve)

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PAGE 2

PAUL NEWMAN

(voice over) ...leads our imagination further and further. How did life begin? Did it happen more than once in the universe?

01:01:05.08
(dissolve)

PAUL NEWMAN

(voice over) The answer may lie on Mars.

01:01:07.18
(dissolve)

NARRATIVE TITLE

ROVING MARS

01:01:22.16

PAUL NEWMAN

(voice over) Mars today is desolate, dry, and barren. And at first glance, has little in common with our own planet. And yet from orbit, we see what looked like dried-up lakebeds and canyons.

01:01:50.29

PAUL NEWMAN

(voice over) Clues that three or four billion years ago, Mars may once have been wetter and more Earth-like. And since life blossomed here on Earth, the question is: Did it...

01:02:04.07

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PAUL NEWMAN

(voice over) ...ever take place on Mars?

PEOPLE IN CONTROL ROOM

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

CONTROL ROOM MALE REPORTER #1

(over speaker) And just a heads-up as always, uh, there's a chance we might... (continues indistinct under following dialogue)

PAUL NEWMAN

(voice over) To answer this question, NASA's jet propulsion laboratory brought together a team of scientists and engineers whose mission was to discover if Mars ever had what was needed to support life.

CONTROL ROOM MALE REPORTER #1

(over speaker) --the, uh, support structure... (continues indistinct under following dialogue)

PAUL NEWMAN

(voice over) A geologist and astronomer at Cornell University...

CONTROL ROOM FEMALE REPORTER #1

(over speaker) (overlapping) (continues indistinct under following scene and dialogue)

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PAGE 4

PAUL NEWMAN
(voice over) ...Steve Squyres...

01:02:36.21

PAUL NEWMAN
(voice over) ... was chosen to lead the science team. As principal investigator, he would direct the team's search for life's most essential resource: water.

CONTROL ROOM FEMALE REPORTER #1
(over speaker) ...online, so we've got... (continues indistinct under following dialogue)

STEVE SQUYRES
(voice over) I've been working on the question of water on Mars for twenty-eight years. You can't learn what you need from a telescope. You must be a geologist.

01:02:55.26

STEVE SQUYRES
A geologist is sort of like a detective...

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NARRATIVE TITLE

STEVE SQUYRES
Principal Science Investigator

STEVE SQUYRES

...at the scene of a crime. Um, somethin' happened here a long time ago. What happened? Was it warm? Was it wet? Could life have existed here? The key is in the clues and the clues are in the rocks.

01:03:11.00

STEVE SQUYRES

(voice over) On Earth, a geologist can find an interesting rock, crack it open with a hammer, and just look at what's inside. But we're not ready to send a human geologist to Mars yet.

01:03:21.20

STEVE SQUYRES

(voice over) So we had to build a robot geologist. And the only place this could be done was NASA's jet propulsion laboratory where some of the most innovative...

01:03:35.04

STEVE SQUYRES

(voice over) ...engineers in the country work. We're talking about a...

01:03:38.14

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STEVE SQUYRES

(voice over) ...robot. A rover that can go to Mars...

01:03:40.14

STEVE SQUYRES

(voice over) ...land on the surface, take a look around, and then cut the cord and go...

01:03:45.08

STEVE SQUYRES

(voice over) ...carrying everything it needs with it: cameras, instruments, communications equipment. Everything.

01:03:55.23

NASA EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

STEVE SQUYRES

(voice over) Something that can look inside rocks and that can tell us what clues those rocks hold.

01:04:03.04

NARRATIVE TITLE

**PAYLOAD HAZARDOUS
SERVICING FACILITY
Kennedy Space Center**

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STEVE SQUYRES

(voice over) This place, to me, is almost sacred. This is the place where our rovers are assembled for the last time before they leave this planet. Everything that we do in this room must be perfect.

01:04:23.18

STEVE SQUYRES

(voice over) Over four thousand people have worked on this mission.

01:04:28.21

STEVE SQUYRES

(voice over) For every single piece of this spacecraft down to the tiniest one, there was a person...

01:04:33.29

STEVE SQUYRES

(voice over) ...somewhere who conceived it. Who nurtured it. Who took it from a concept to something real. It's taken this team three years to design and build and test these rovers and...

01:04:47.15

STEVE SQUYRES

(voice over) ...we still have work to do.

01:04:51.25

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STEVE SQUYRES

(voice over) We can only launch when the two planets are properly aligned and that's just a month away. But we still have tests to run. We're working in shifts. We're working almost around the clock and we don't know if we're gonna make it.

01:05:06.05

BOB MANNING

(voice over) There's no one person who can really get their arms around the whole thing and say, "I...

01:05:17.23

BOB MANNING

(voice over) ...understand everything about this vehicle."

CONTROL ROOM MALE REPORTER #2

(over speaker) (overlapping) (indistinct to:) Go ahead. (continues indistinct under following dialogue)

BOB MANNING

(voice over) It's now (stammers) burst the bounds of our brains.

CONTROL ROOM MALE REPORTER #2

(over speaker) Stand by, we'll get it.

01:05:27.15

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BOB MANNING**

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Well this rover is-is more than just a roving geologist.

NARRATIVE TITLE

BOB MANNING
Entry, Descent & Landing
Development Manager, JPL

BOB MANNING

This rover also has to be a-a spacecraft.

01:05:34.09

NASA EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

BOB MANNING

(voice over) It actually has to fly itself from Earth to Mars. In addition, it has to do the very subtle and quick timing...

01:05:42.00

BOB MANNING

(voice over) ...control of all the things that happen as it enters and lands the vehicle.

01:05:47.26

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BOB MANNING

We had to stuff all that (stammers) intelligence and capability into that little (stammers) six-wheel vehicle back there, uh, so that it could get there safely on its own.

01:05:56.20

BOB MANNING

(voice over) I call our spacecraft "The Origami Spacecraft," which means it's really a...

01:06:04.09

BOB MANNING

(voice over) ...complicated series of folds. We've had to punch holes in the lander pedals for the wheels to snake through. We've had to fold everything into these complicated shapes to get this system to...

01:06:14.28

BOB MANNING

(voice over) ...fit inside this tetrahedron.

01:06:18.18

BOB MANNING

(voice over) It's beautiful, but at a price. And (stammers) that price in this case is complexity.

01:06:27.13

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STEVE SQUYRES

(voice over) There have been missions to Mars since the sixties.
There've been dozens of them. But two-thirds of those missions failed.

01:06:37.12

(dissolve)

STEVE SQUYRES

(voice over) Mars is a spacecraft graveyard. A spacecraft has to travel about three hundred million miles to get to Mars at about sixty thousand miles an hour. But it still takes seven months to get there. Trying to hit our landing sites from that distance is like shooting a basketball from Los Angeles to New York and having it go through the hoop without touching the rim.

01:07:04.18

NASA EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

STEVE SQUYRES

(voice over) The smallest mistake on our part could put the whole mission in jeopardy. Two of the last three missions to Mars were failures.

01:07:17.12

(dissolve)

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STEVE SQUYRES

(voice over) One spacecraft burned up in the Martian atmosphere, the other one crashed on the surface. This time, NASA decided to send two identical spacecraft to double our chances of success. The two rovers are named Spirit and Opportunity. The rovers have very different personalities. They did even when they were babies, back when we were first building 'em. Spirit was our troublesome first-born. Every test we ran, it seemed that we ran on Spirit first and the first time you try something it usually doesn't work. So we'd run these tests on Spirit and they'd fail and we'd try to fix things and we'd run another test and that would fail too. By the time we got to Opportunity, we'd learn stuff and things went much more smoothly.

NASA EMPLOYEES

(overlapping, low and indistinct cheering)

01:08:03.22
(optical)

STEVE SQUYRES

(voice over) The biggest problem was that we...

01:08:21.12

STEVE SQUYRES

(voice over) ...underestimated the size and weight of the rovers. Once we realized how big they really had to be, we also realized that the landing system we planned to use couldn't...

01:08:30.27

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STEVE SQUYRES

(voice over) ...get them to the ground in one piece.

01:08:34.29

BOB MANNING

As the rover got heavier, the lander got heavier. As the lander got heavier, the...

01:08:37.22

BOB MANNING

(voice over) ...arrow shell got heavier. The whole thing got heavier and heavier and heavier. From the very beginning on this mission, it seemed like nothing was going right.

STEVE SQUYRES

(voice over) The air bags are like the air bags in your car but (emphasizing) way (in normal voice) more expensive. They inflate explosively around the vehicle and they cushion the landing. The first time we tested them, they tore open and deflated.

CHARLES ELACHI

(off) (in Lebanese accent) The setbacks...

01:09:05.14

CHARLES ELACHI

...we knew they are going to happen.

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NARRATIVE TITLE

Dr. Charles Elachi
Director, Jet Propulsion Laboratory

CHARLES ELACHI

I always tell people when you start these projects. Uh, the same thing probably what happened to Lewis and Clark and, uh, Captain Cook in their exploration. Uh, what is guaranteed is that there will be setbacks.

01:09:17.18

MALE CHUTE COUNTDOWN ANNOUNCER

(voice over) (over radio) Three...two...one.

STEVE SQUYRES

(voice over) These rovers have to land using a supersonic parachute. The parachute design we thought would work ripped to shreds. The lander had gotten so heavy that the chute just couldn't handle it. We were practically out of time and all we had was a chute design that would destroy the spacecraft when we tried to land.

01:09:41.13

BOB MANNING

(voice over) We had to build a whole 'nother set of new designs. No less...

01:09:46.04

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BOB MANNING

(voice over) ...than three or four designs that we had to test in the three months that followed in a mad rush to make...

01:09:51.08

BOB MANNING

(voice over) ...it to the launch pad. We were running out of money, we were running out of time.

01:09:58.13

ADAM STELTZNER

(voice over) Uh, well, I mean, the drop was successful.

MALE #1 AT CRASH SCENE

(voice over) (overlapping) In a lot of ways...

01:10:01.17

MALE #2 AT CRASH SCENE

(off) Yeah.

MALE #3 AT CRASH SCENE

(off) We're goin' back.

ADAM STELTZNER

(overlapping) See, uh, the fact that, uh, the parachute exploded...not a good thing.

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NARRATIVE TITLE**

PAGE 16

Adam Steltzner
Mechanical Systems Lead

PEOPLE AT CRASH SCENE

(overlapping, low and indistinct chatter - continues under following dialogue)

MALE #2 AT CRASH SCENE

Well, yeah, I'd rather have it happen here than any place else.

ADAM STELTZNER

(overlapping) (interrupting) Mars.

MALE #2 AT CRASH SCENE

Yeah.

FEMALE AT CRASH SCENE

(overlapping) Well, that's true.

ADAM STELTZNER

That's right. Unfortunately, strictly speaking, that chute that just exploded was the chute that we were planning on taking to Mars.

MALE #2 AT CRASH SCENE

(chuckles)

01:10:17.29

**"ROVING MARS"
FINAL DIALOGUE LIST**

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PEOPLE AT PARACHUTE TESTING SITE

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

MALE CHUTE REPORTER #1

(over speaker) We got a good chute.

MALE CHUTE REPORTER #2

(over speaker) 'Kay, let's drive the fan blade to five point five.

MALE CHUTE REPORTER #1

(over speaker) Copy that.

MALE CHUTE REPORTER #3

(over speaker) It looks absolutely perfect.

MALE CHUTE REPORTER #1

(over speaker) All right.

01:10:27.22

NASA EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

STEVE SQUYRES

(voice over) Mars is a tough place to send a...

01:10:57.08

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STEVE SQUYRES

(voice over) ...spacecraft. The average temperature is sixty degrees below... 01:11:00.08

STEVE SQUYRES

(voice over) ...zero. It goes down to a hundred below zero at night. There can be dust storms that darken the skies for months at a time. But if the rovers make it, they'll give us the experience of what it would be like to be on Mars. We'll be able...

STEVE SQUYRES

(voice over) ...to look off into the distance and say, "Yeah. I'd like to go there," and then... 01:11:17.08

STEVE SQUYRES

(voice over) ...actually go and see what we find.

01:11:23.05

STEVE SQUYRES

The rover's arm has the same dimensions as a human arm with a shoulder, an elbow, and a wrist. The arm tucks up tight under the front of the vehicle for when we drive around. But when we get to a rock that we want to examine, the arm unstows and reaches out using all of its joints to place the instruments on a rock and to begin to study them.

01:11:50.14

NASA EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

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STEVE SQUYRES

(voice over) The hand has four fingers. One is a microscope, two are spectrometers to tell us, in detail, what the rocks are made of. And the fourth one is called the RAT.

01:11:50.14

STEVE SQUYRES

(voice over) The Rock Abrasion Tool.

01:12:08.01

NARRATIVE TITLE

MARS

STEVE SQUYRES

(voice over) To examine the rocks, we've got to get to them and Mars is very bumpy. So to deal with the bumps, our engineers came up with something...

01:12:19.26

STEVE SQUYRES

(voice over) ...called a rocker-bogie suspension system. It's a very clever design that allows each of the six wheels to go up and over a rock independently while the rover itself hardly tilts at all.

MALE ROVER DEMONSTRATOR

(voice over) 'Kay. Come on in, guys. (sniffs - continues under following scene)

01:12:38.00

**"ROVING MARS"
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CHILDREN AT DESERT TEST SITE

(overlapping, low and indistinct chatter - continues under following dialogue)

MALE ROVER DEMONSTRATOR

Now stay clear, watch it. Watch it. Stay clear of this thing 'cause it's gonna move in a second. Watch! Watch the wheels. Watch the wheels. Watch the wheels. Now watch.

GIRL #1 AT DEMONSTRATION

(overlapping) Whoa.

STEVE SQUYRES

(voice over) (overlapping) It goes way beyond this single mission.

MALE ROVER DEMONSTRATOR

See that?

STEVE SQUYRES

(voice over) The eventual goal is to send humans to Mars.

MALE ROVER DEMONSTRATOR

(overlapping) It doesn't move very fast, does it?

STEVE SQUYRES

(voice over) (overlapping) But the first person...

01:12:49.26

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MALE ROVER DEMONSTRATOR

(off) (chuckles - continues under following dialogue)

STEVE SQUYRES

(voice over) ...to walk on Mars is not an astronaut today.

MALE ROVER DEMONSTRATOR

(off) (overlapping) (indistinct to:) Watch.

STEVE SQUYRES

(voice over) (overlapping) It's someone in high school. Or...

01:12:53.26

STEVE SQUYRES

(voice over) ...in elementary school.

MALE ROVER DEMONSTRATOR

(off) So it's turnin' in place, then when it...

01:12:57.25

MALE ROVER DEMONSTRATOR

...gets lined up just right, we're gonna drive it backwards.

01:13:03.15

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STEVE SQUYRES

(voice over) We've invested so much work...so many years...so much of our hopes and our dreams into these rovers.

01:13:15.03

STEVE SQUYRES

(voice over) And then when you think about where they're going, the ride they're gonna get on that rocket, the transit through space, what it's gonna be like when that parachute goes out at mach two goin' through the Martian atmosphere....

01:13:33.03

STEVE SQUYRES

(voice over) You're standing next to this little robot and you realize it's gonna spend eternity on the surface of another world. It's goin' to another planet for real.

01:13:46.06

STEVE SQUYRES

(voice over) And once they're gone, that's it. After the rovers launch, we're never gonna see them again with our own eyes. We've done everything we can to prepare them for the dangers they'll have to face. But it's gonna be very hard to say goodbye.

01:14:05.28

NARRATIVE TITLE

NASA

01:15:03.11

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PEOPLE AT LAUNCH SITE

(overlapping, low and indistinct chatter - continues under following scenes and dialogue) 01:15:22.08

STEVE SQUYRES

(voice over) Spirit will be launched first, then Opportunity, three weeks later. Mars and Earth are both orbiting the sun so they're always moving relative to each other. Every twenty-six months, there's... 01:15:35.24

STEVE SQUYRES

(voice over) ...a brief interval when the planets are lined up just right. At that time, and only at that time, we have enough rocket fuel to make it. So this is our one shot. 01:15:47.16

MALE LIFT-OFF ANNOUNCER

(voice over) (over radio) Five...four...three...two...one... 01:16:13.20

STEVE SQUYRES

(voice over) We don't fire a rocket motor all the way to Mars. 01:17:47.18

STEVE SQUYRES

(voice over) We don't need to. We just place the spacecraft on a trajectory to Mars and let it coast for seven months and three hundred... 01:17:57.10

**"ROVING MARS"
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STEVE SQUYRES

(voice over) ...million miles until it reaches the planet.

BOB MANNING

(voice over) Once it's been pushed on it's way to Mars by the launch vehicle...

01:18:04.28

BOB MANNING

(voice over) ...it has to, uh, maintain its orientation toward the sun and it needs to be able to correct its orientation and direction so that it would hit Mars and-and get to this very, very tiny, uh, spot on Mars that we're aiming for. (stammers) So all that has to take place over the course of the seven month journey.

01:18:24.02

NARRATIVE TITLE

JET PROPULSION LABORATORY
California Institute of Technology
Pasadena, California

01:18:34.20

JPL EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

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NARRATIVE TITLE

Jet Propulsion Laboratory
California Institute of Technology

NARRATIVE TITLE

7 MONTHS AFTER LAUNCH

NARRATIVE TITLE

SPIRIT LANDING DAY

01:18:43.23

STEVE SQUYRES

(voice over) Planning is when the real challenge begins. Mars is so far away it takes about ten minutes for a radio signal to travel one way between Mars and Earth. But it's only six minutes from when you first hit the top of the Martian atmosphere to when we're bouncing on the surface. So there's nothing we can do to help when it's time to land. The rovers are on their own, and we're just passive...

01:19:14.11

STEVE SQUYRES

(voice over) ...passionately interested observers waiting for a radio signal that shows whether or not they've survived.

01:19:18.13

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JPL MALE EMPLOYEE #1

(off) (into radio) Copy that, thank you, ACS.

01:19:22.16

WAYNE LEE

(off) (into radio) Not going to be an issue. The current reported temperature is about zero...

01:19:27.26

WAYNE LEE

(into radio) ...degrees Celsius which, um, is close to (stammers) the limit-- the flight allowable limit. However (continues indistinct under following dialogue)

WAYNE LEE

(voice over) (overlapping) Landing a spacecraft on Mars is so (chuckling) complicated. There are (in normal voice) so many things that can go wrong.

01:19:38.08

WAYNE LEE

The flight computer has to know precisely the right time to deploy the parachute.

NARRATIVE TITLE

WAYNE LEE
Entry, Descent & Landing
Chief Engineer, JPL

**"ROVING MARS"
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WAYNE LEE

If it deploys it too high, when the parachute opens the (stammers) wind forces will just rip it to shreds. If we deploy the parachute too low of an altitude, it won't open (stammers) in time and it will just crash right into the ground. 01:19:53.24

JPL EMPLOYEES

(overlapping, low and indistinct - continues under following scenes and dialogue)

STEVE SQUYRES

(voice over) The trick is, every time there's some critical event: the parachute deploys, the heat shield falls away, we...

01:20:01.19

STEVE SQUYRES

(voice over) ...change the frequency of the radio signal. And so Polly's sitting at her console...

NARRATIVE TITLE

Mission Control

01:20:06.03

STEVE SQUYRES

(voice over) ...and she's looking for these changing frequencies and when the number changes, she knows that this event has happened. That event has happened.

01:20:16.21

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JASON WILLIS

(voice over) (over radio) Flight director, Jason Willis, reporting that all systems are go for entry...

01:20:22.11

JASON WILLIS

(voice over) (over radio) ...descent and landing. We are roughly eleven minutes, forty-eight seconds from landing at the Gusev Crater in the southern hemisphere of Mars.

01:20:28.15

JASON WILLIS

(voice over) (over radio) Atmospheric entry in three...two...

01:20:40.28

JASON WILLIS

(voice over) (over radio) ...one.

01:20:47.05

JPL EMPLOYEES

(overlapping, low and indistinct chatter - continues under following scenes and dialogue)

WAYNE LEE

(into radio) We have just passed one minute to atmospheric entry. Current altitude: one hundred and twenty-one miles. Current velocity: twelve thousand eighty-four miles per hour.

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FINAL DIALOGUE LIST**

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POLLY

(into radio) Copy.

01:20:58.19

WAYNE LEE

(over radio) We are now at an altitude of seventy-three miles, moving at a speed of twelve thousand one hundred ninety-two miles per hour. Expected...

01:21:05.28

WAYNE LEE

(over radio) ...parachute deploy in five seconds. Four...three...two...

01:21:11.01

WAYNE LEE

(voice over) (over radio) ...one...mark. We're awaiting confirmation the parachute has deployed.

01:21:19.05

JASON WILLIS

(voice over) (over radio) Parachute's been detected.

01:21:25.07

JASON WILLIS

(voice over) (over radio) Heat shield deployed event.

**"ROVING MARS"
FINAL DIALOGUE LIST**

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JPL EMPLOYEES

(over radio) (overlapping, indistinct chatter and cheers - continues under following scenes and dialogue)

WAYNE LEE(voice over) (over radio) Uh, spacecraft reporting that heat shield has indeed jettisoned...

JASON WILLIS

(voice over) (over radio) Heat-heat-- Lander...

01:21:33.23

JASON WILLIS

(voice over) (over radio) ...separation event has been detected.

WAYNE LEE

(voice over) (over radio) Spacecraft reporting lander has separated. Moving at a speed of one hundred seventy-three miles per hour. We are near our terminal velocity.

01:21:39.22

WAYNE LEE

(voice over) (over radio) Expected retro...

01:21:44.14

WAYNE LEE

(voice over) (over radio) ...rocket ignition on my mark. Mark.

01:21:49.23

**"ROVING MARS"
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WAYNE LEE

(voice over) (over radio) At this point in time, we should be on the ground.

01:21:58.18

WAYNE LEE

(voice over) (over radio) Any signal that we receive from now indicates the vehicle would be alive, on the ground, and bouncing. The spacecraft has to survive all the bounces for the landing to be a success.

01:22:22.18

JASON WILLIS

(voice over) (over radio) No signal at the moment.

WAYNE LEE

(voice over) (over radio) Standby.

01:22:30.28

WAYNE LEE

(over radio) Signal strength is currently intermittent.

01:22:36.14

JASON WILLIS

(over radio) We don't see a signal at the moment.

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WAYNE LEE

(over radio) Right. We saw an intermittent signal that indicated we were bouncing...

01:22:42.16

WAYNE LEE

(over radio) ...however...however, we currently do not have signal from the spacecraft.

POLLY

(off) (over radio) Okay.

01:22:46.10

JASON WILLIS

(voice over) (over radio) Please stand by.

01:22:49.25

POLLY

(off) If it's anything--

01:22:53.24

WAYNE LEE

(off) (into radio) This time, we're approximately ten minutes (on) (into radio) after landing. The vehicle should have rolled to a stop by now. The deep space network stations at Goldstone and Canberra are still searching for the signal.

01:23:02.23

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POLLY

(off) They see it.

01:23:13.06

WAYNE LEE

(off) (into radio) In other words, where do we see--?

POLLY

(off) (overlapping) They see it! They see it!

01:23:13.06

WAYNE LEE

(off) We've got the signal!

POLLY

(off) (overlapping) They see it!

JPL EMPLOYEES

(overlapping, low and indistinct chatter and cheering - continues under following scenes)

01:23:15.10

STEVE SQUYRES

(voice over) The first thing we have to do after we land is open our solar panels to the sun so we'll have some power. This charges up the batteries. After that, we can deploy the camera mast so the rover can see and deploy the antenna so the rover can talk to us.

01:24:50.29

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JPL EMPLOYEES

(voice over) (overlapping, indistinct chatter and cheering - continues under following scenes and dialogue)

01:25:00.04

MISSION CONTROL MALE ANNOUNCER

(off) Our first pictures from Mars!

01:25:17.24

JPL MALE EMPLOYEE #2

Look at that!

JPL FEMALE EMPLOYEE

What is that?

JPL MALE EMPLOYEE #3

(face off) That's looking (on) down (face off) on our vehicle.

01:25:28.29

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JPL EMPLOYEES

(voice over) (overlapping, indistinct chatter and cheering - continues under following scenes and dialogue)

SEAN O'KEEFE

(over speaker) We could...

01:25:50.26

SEAN O'KEEFE

(into microphone) ...not have imaged...

01:25:52.26

NARRATIVE TITLE

Sean O'Keefe
NASA Administrator

SEAN O'KEEFE

(into microphone) ...returns as early as this, as clear as this, as successful as this, and in the volume that it has been. Uh, ladies and gentlemen, Mars.

01:26:07.06

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STEVE SQUYRES

(voice over) We sent Spirit to Gusev Crater, a crater in the southern highlands of Mars. It's a hundred miles in diameter. What makes it special is that emptying into it is a giant watercarved channel. So Gusev is a hole in the ground with a dry river flowing into it. There has to have been a lake in this crater once upon a time. We sent Spirit there to seek out sediments. To look for sedimentary rocks that were laid down long ago in that lake. Once we landed, I think the scariest part of the whole mission...

01:26:56.20

STEVE SQUYRES

(voice over) ...was the initial unfolding of the rover. There are so many gears and springs and motors and hinges and latches that have to work just right or you're done.

01:27:21.11

STEVE SQUYRES

(voice over) Once everything's deployed, we're ready to start lookin' around. We can look off into the distance with our cameras...

01:27:28.19

STEVE SQUYRES

(voice over) ...and with our infrared spectrometer, and we can learn (emphasizing) a lot (in normal voice) from a distance of fifty yards, a hundred yards...about what the rocks look like and what they're made of. Then, if we see a rock that has a...

01:27:39.00

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STEVE SQUYRES

(voice over)...texture or a composition that looks interesting to us, we can drive over to it and check it out in detail. For driving, the rover...

01:27:55.18

STEVE SQUYRES

(voice over) ...has these kinda googly-eyed cameras that it uses to take images of the terrain in front of it. They've got wide-angle lenses...

01:28:01.20

STEVE SQUYRES

(voice over) ...and they provide sort of a fish-eye view.

01:28:04.19

STEVE SQUYRES

(voice over) Spirit uses these pictures to...

01:28:07.05

STEVE SQUYRES

(voice over) ...make it's own decisions about how to drive. It'll drive forward and then take a look at a rock and say, "That's too big, I have to go around that." Or, maybe it'll see smooth sailing and just move on.

01:28:17.06

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STEVE SQUYRES

(voice over) But we can actually program different levels of courage or cowardice into the rover, telling it how aggressive it should be depending on how dangerous we think the terrain is. These rovers are so complicated, that it takes hours to get a set of commands right. So when we operate 'em, we'll normally send commands to them just once a day.

01:28:38.19

STEVE SQUYRES

(voice over) The first rock that we looked at was this one. We named it Adirondack.

01:28:44.28

STEVE SQUYRES

(voice over) When a rock sits on the surface of a planet, it can undergo what's called 'weathering.' When it's exposed to sunlight or humidity or wind, the surface of the rock can be modified and the evidence of how it formed can be destroyed.

01:28:56.14

STEVE SQUYRES

(voice over) So to get to the clues you need, you have to get inside the rock below the weathered surface.

01:29:02.09

STEVE SQUYRES

(voice over) The key to understanding Adirondack was the rock abrasion tool. The RAT gives us the ability to grind into a rock, exposing the unaltered evidence inside.

01:29:16.19

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STEVE SQUYRES

(voice over) So we put a RAT hole into Adirondack and then we hit it... 01:29:27.29

STEVE SQUYRES

(voice over) ...with everything we had. We looked at it with our cameras, we looked at it with our spectrometers, we looked at it with our microscope. Adirondack is a piece of lava. It's not a sedimentary rock. 01:29:38.09

STEVE SQUYRES

(voice over) And every other rock around it is a piece of lava too. This was a huge disappointment. We came to Gusev Crater looking for sediments that were laid down long ago in a lake, but what we found was lava. Volcanic rock. The sedimentary rock must be there but it's been buried under the lava and we couldn't get to it. When we realized that we hadn't landed on the stuff we came for, we decided we had to go some place else. A mile and a half away, there's this spectacular range of hills called the Columbia Hills. You gotta remember that Spirit was designed to go only six hundred yards over its lifetime. 01:30:16.19

STEVE SQUYRES

(voice over) So we set out for those hills not knowin' if we'd ever make it. Meanwhile, on the other side of Mars, Opportunity was about to land. 01:30:30.02
(fade in)

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STEVE SQUYRES

(voice over) When Opportunity landed at Eagle Crater, it was a three-hundred million mile interplanetary hole-in-one.

01:31:00.27
(fade out)

STEVE SQUYRES

(voice over) We rolled to a stop right in front of layered bedrock. Bedrock is geologic truth. Opportunity landed in front of a Martian history book.

01:31:13.18

STEVE SQUYRES

(voice over) When we drove off the lander and looked at the soil in front of us, we saw that it was littered with what looked...

01:31:22.21

STEVE SQUYRES

(voice over) ...like little round beads. An uncountable number of little round things.

01:31:28.23

STEVE SQUYRES

(voice over) We took out our microscope, we reached out, and looked at the soil in detail and the picture that came down was astounding.

01:31:35.08

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STEVE SQUYRES

(voice over) They were perfect spheres. I will remember for the rest of my life how I felt when I saw that...

01:31:43.09
(dissolve)

STEVE SQUYRES

(voice over) ...first picture.

01:31:50.19

STEVE SQUYRES

(voice over) When we got to the outcrop and looked at it up close, we realized that the spheres are embedded in the rock, like blueberries in a muffin. The rock erodes away and the blueberries fall out. And...

01:32:02.24

STEVE SQUYRES

(voice over) ...roll down into the soil.

01:32:07.03

STEVE SQUYRES

(voice over) The blueberries, it turns out, are made of hematite, a mineral that on Earth is often formed in liquid water. Next, we...

01:32:15.09

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STEVE SQUYRES

(voice over) ...found jarosite, which is a mineral that couldn't have formed unless there had been water in the rocks. So there was water underground here.

01:32:23.04
(dissolve)

STEVE SQUYRES

(voice over) Our most extraordinary discovery came when we found ripples in the rocks. Ancient ripples that formed when water flowed over sand on Mars billions of years ago. So there wasn't just water underground here...there was water at the surface.

01:32:37.27
(dissolve)

STEVE SQUYRES

(voice over) Opportunity discovered that at this place billions of years ago, Mars was most likely a habitable world. It was a place that, for some interval of time, was suitable for some forms of life. Decades of work paid off with this discovery.

01:32:58.19

STEVE SQUYRES

(voice over) Billions of years ago there were shallow, occasional pools of water. Don't think an ocean, think of salt flats. And the water may not have been a pretty blue. In fact, it may have been so acid it dissolved iron out of the rocks and made wine-red pools under a pink Martian sky.

01:33:26.29

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STEVE SQUYRES

(voice over) All the discoveries that Opportunity made about water happened in the first six weeks of the mission. Everything went right for that rover. I call Opportunity "Little Miss Perfect". Opportunity lands in this place where the evidence is right there. The driving is like a parking lot. Everything is perfect.

01:33:52.19

STEVE SQUYRES

(voice over) Spirit, our kinda tough hard-working blue collar rover lands in this awful, rocky, rugged place on a lava plane a mile and a half from the nearest interesting rocks and has to struggle for five months just to begin her mission.

01:34:07.15

STEVE SQUYRES

(voice over) Spirit had to work for everything, literally had to climb a mountain on Mars.

01:34:16.25

STEVE SQUYRES

(voice over) We use the power that comes from the sun to operate the vehicle and to charge the batteries. So the solar arrays are essential. On the way to the Columbia Hills, Spirit's solar rays were...

01:34:27.21

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STEVE SQUYRES

(voice over) ...getting coated with dust. We were getting to the point where Spirit was simply gonna die. Then, one wonderful day...

01:34:36.00

(dissolve)

STEVE SQUYRES

(voice over) ...we climbed up onto the crest of a ridge where we were hit by not one but several gusts of wind that just cleaned the solar arrays off.

01:34:43.02

(dissolve)

STEVE SQUYRES

(voice over) It was like having a brand new rover. Spirit...

01:34:48.03

STEVE SQUYRES

(voice over) ...got high up in the Columbia Hills and started to find stuff that was different from anything we'd seen. There were salt deposits in the hills and there were rocks that clearly had been altered by water. It took months of work and struggle but Spirit finally showed us there had been water on both sides of the planet. She gave us exactly what we needed.

01:35:07.17

(dissolve)

**"ROVING MARS"
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BOB MANNING

(voice over) These rovers were designed to last only ninety Mars days and they've already done many times that. They've developed personalities. They're work horses. They say, "Push us. Ask us to do more. We can go further, we can go faster." So we asked so much more than they were ever intended to. And to our amazement, they'd do it.

01:35:30.10
(dissolve)

BOB MANNING

(voice over) We don't know what will kill these rovers; they do get old, motors break, lubrication goes away in the motors, the wheels may stop turning. We have no idea what will happen.

01:35:44.12

BOB MANNING

(voice over) But they're not gonna last forever. And as the dust keeps falling, the solar arrays keep getting dirty. What could happen, with time, is some day we won't be...

01:35:55.11

BOB MANNING

(voice over) ..able to charge the batteries enough to keep the rover warm at night. And if that happens, the rover's going to get too cold. And one morning, it just won't wake up.

01:36:07.17
(fade out)

**"ROVING MARS"
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STEVE SQUYRES

(voice over) Spirit and Opportunity have shown us that once, three to four billion years ago, Mars had the essential ingredients for life. So the next step is to...

01:36:21.04
(dissolve)

STEVE SQUYRES

(voice over) ...seek out evidence of life itself. Right now, we have one example of life. Us. We may be all there is. We simply don't know.

01:36:31.14

STEVE SQUYRES

(voice over) But if you can show that life developed twice in one solar system and then you considered the multitude of solar systems out there, it takes no great leap of imagination to believe that life might be a common phenomenon throughout the universe.

01:36:50.05

STEVE SQUYRES

(voice over) Our rovers have gone farther, harder, and longer than even we, their creators, believed possible. They've done heroic work.

01:37:02.20

**"ROVING MARS"
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STEVE SQUYRES

(voice over) But some day we won't need robots. Some day, there'll be humans on the surface of Mars and boot prints in our wheel tracks.

01:37:16.04

STEVE SQUYRES

(voice over) This mission has put us on a great trajectory to learn more about Mars and about ourselves. But right now, Spirit and Opportunity are still roving Mars. It's not just that they've exceeded our wildest dreams. In many ways, they (emphasizing) are (in normal voice) our wildest dreams.

01:37:59.27

(fade out)

MALE SINGER

(voice over) (sings under following end credits)

01:39:58.21

LAST FRAME OF PICTURE IS 01:39:58.21

END OF FILM