Name: _____ Date: _____

The Landing That Almost Failed

Reading level 10 (6th grade) · 873 words

The number was 1202. It flashed on the computer inside Eagle, the lunar module, as Neil Armstrong and Buzz Aldrin fell toward the Moon on July 20, 1969. "Program alarm," Armstrong said to Houston. "It's a 1202." The two men had never seen that alarm in their practice runs. The computer was doing most of the flying, and the two men were watching it work. Below them lay the Sea of Tranquility, and the landing was only minutes away. What did the number mean? Could they keep going?

Far away in Houston, the question landed on an engineer named Steve Bales. He knew the lunar module's computer better than anyone in the room. If the alarm meant the computer was failing, the crew would have to give up the landing and fly back up. If it did not, they could go on. Eagle was still falling, There was no time to look anything up. Bales had only a few seconds to choose.

Nobody in the room could see the real trouble yet. The computer was being asked to do too many jobs at once. A radar switch was set to AUTO, exactly as the astronauts' checklist said, so the computer kept hunting for radar data that it did not need. All that extra work piled up. About every ten seconds, the computer cried out with its alarm. It was like a person juggling so many balls that every few moments one of them says so out loud.

But the computer had been built for a day like this. Its makers had taught it to put the big jobs first. When there was too much to do, it dropped the small jobs, like refreshing a display, and kept on with the big ones, like steering the landing. So the alarm did not mean the computer was broken. It meant the computer was busy, and it was still doing the jobs that mattered most.

Bales said go. Jack Garman, a software engineer in the back room, had reached the same answer. Then the words came from Houston that the crew needed to hear: "We're go on that alarm." Later a second alarm, 1201, flashed. The crew did not know that one either. A single word from the ground could end the landing, and the word was go. Eagle kept falling toward the Moon, and the people in Houston held their breath.

Then Armstrong looked out of his window, and he did not like what he saw. The computer was steering Eagle toward a field of big rocks beside a crater. If a landing leg or the engine hit a boulder, the lander could be damaged, and that would be a terrible thing to find out on the Moon. So Armstrong took over manual control and steered by hand. He tipped Eagle forward and flew it like a helicopter.

He slowed Eagle's fall, then flew on, past the craters and the boulders, for about eleven hundred feet. That is farther than three football fields. Aldrin read out their height and speed,

one number after another, so that Armstrong could keep his eyes on the ground. Every patch of ground that he looked at seemed too rough or too rocky. And every second that he spent looking, the engine was burning fuel that he would need in order to land.

In Houston, nobody could say exactly how much fuel was left. The number could be wrong by about twenty seconds. If the fuel got too low, Flight Director Gene Kranz would have to order the crew to stop and fly back up. As Eagle came down through seventy-five feet, Charlie Duke radioed that the crew had sixty seconds of fuel left. Armstrong kept looking for a safe place to stand.

At last a light came on in the cabin: the contact light. The long probes that hung under Eagle's legs had touched the Moon. A second or two later the engine was off, and Eagle stood still. Armstrong said, "Houston, Tranquility Base here. The Eagle has landed." A controller in Houston answered, "You got a bunch of guys about to turn blue, we're breathing again." Mission Control erupted in cheers. Eagle was down at 4:17 in the afternoon, Eastern time.

How much fuel was left? NASA's pages do not agree. One says thirty seconds. Another says experts checked the numbers after the flight and found about forty-five. Picture a car rolling into the gas station on its last drop of gas. Both agree on one thing, though. Of all the Apollo landings, this one had the smallest margin. Nobody could have known that in the room, with the alarm ringing and a few seconds to decide. For the next flight, Apollo 12, NASA improved the fuel gauge.

About six and a half hours later, Armstrong climbed out and took his first step on the Moon, while more than half a billion people watched on television. The world remembers what he said. Hardly anyone remembers the 1202 alarm. But on that day a computer that knew what mattered most, and a man who knew his computer, kept the landing going. What would you need to know, with a screen full of numbers and a few seconds to decide?

Questions

1. What was going wrong inside Eagle's computer?

A. The Moon was too far away
B. It had too many jobs at once
C. The crew was asleep

2. Why could Houston say go with the alarm still ringing?

A. The alarm had stopped
B. The crew had a spare computer
C. The computer kept doing its biggest jobs first

3. Why did Armstrong take over the steering by hand?

A. The computer was heading for big rocks
B. The computer was broken
C. He was bored

4. What does "manual" mean in this book?

A. By accident
B. By hand
C. By radio

5. Why does the book say NASA's pages do not agree?

A. They name different astronauts
B. They give different dates
C. They give different amounts of fuel left

6. Why was Bales's choice so hard?

A. He had only a few seconds, and a wrong answer could end the landing
B. He had never met the crew
C. He had no computer

Words to know

alarm: warning signal
lander: landing craft
boulder: huge rock
manual: by hand
engineer: builder and fixer
margin: room to spare

Answer key: The Landing That Almost Failed

1. B. It had too many jobs at once
2. C. The computer kept doing its biggest jobs first
3. A. The computer was heading for big rocks
4. B. By hand
5. C. They give different amounts of fuel left
6. A. He had only a few seconds, and a wrong answer could end the landing