Prologue

daedalus array: lunar farside

For all practical purposes, Daedalus Crater was the most remote spot in the solar system. Centered 180 degrees away from Earth and only 4 degrees below the lunar equator, Daedalus never saw or heard Earth, never received stray radio waves that might diffract over the lunar horizon and ruin delicate astronomical measurements.

Here in the orbital shadow, Daedalus Crater was the perfect spot to station a VLF—Very Low Frequency—array to study portions of the radio spectrum that on Earth were drowned out. Massive dipole antennas sprawled kilometers across the flat floor of the crater in a Y-shaped array encircled by the crater walls, making the site look like a giant Mercedes-Benz emblem.

Because of its remoteness, the VLF site had to function autonomously. All instruments had been designed to run by themselves, to fix themselves with modular replacement parts, to be inspected by telepresence repair drones. With the unchanging nature of the Moon, the VLF should have operated for decades without human intervention.

Until absolutely everything went wrong.

Trevor "Can't Wait" Waite drew a stale breath from the cramped cabin of the lunar hopper as they approached the site. The hopper had been launched from Moonbase Columbus on an investigation and repair mission, and Waite fidgeted until he could go outside and have a look for himself. The scientists Earthside were screaming about their interrupted VLF data, and

Can't Wait Waite could troubleshoot faster than anyone else on the base.

Unfortunately, even with ninety-five percent of the hopper's systems automated, outdated safety regs still demanded a full crew of three, with one person to remain inside the vehicle and two required on every extravehicular activity. Waite figured he could have taken care of the problem himself in an hour or so; he was convinced that Sig Lasserman's caution and Becky Snow's neophyte bumbling would triple the time required.

The hopper approached the lunar surface on the upper rim of Daedalus Crater. It was difficult to see in the lunar night. "I am taking her down slowly," Siegfried Lasserman said. He spoke in a clipped German accent as he worked at the lander controls.

"Of course you are," Waite mumbled. He checked over his suit, anxious to be outside and tinkering with the malfunctioning antennas. *Let's get the show on the road!*

He hated to waste time sending a human to do a robot's job, but all the automatic sensors on the VLF had gone screwy, all the maintenance routines had failed, and no one could figure out just which branch in the endless fault-tree had been responsible for the breakdown. Two of the array's dipole antennas had blipped out within an hour of each other; a third quit less than a day later. The three defective units stood in a row, possibly signifying that the malfunction was spreading sequentially. And even worse, the repair drones would not respond.

Moonbase Columbus couldn't even get a visual of the Daedalus site. Waite wondered if something as major as a meteor strike could have wrecked a portion of the array—but all the seismic sensors had been silent as fossils.

"Why is he setting us down up here?" Becky Snow asked, interrupting Waite's thoughts. "This wasn't briefed in the preflight." Her black eyes were wider than they should have been; perspiration glistened on her ebony cheeks and forehead.

Lasserman's attention didn't waver from the controls. "To protect the array from any dust the hopper will kick up. The upper rim of the crater has an access road down to the floor. We'll be close enough up here."

"You'll see the array even in the darkness once we're down the access road," Waite said. Becky Snow had never been to the Farside before and had been on the Moon itself only five weeks. He hated being somebody's on-the-job training instructor.

Lasserman set the hopper down on the landing area blasted flat behind the crater rim. He switched to a different set of controls, powering down the methane engines, as Waite and Snow twiddled their thumbs until their own work could begin. They wore their EVA suits though the hopper cabin was fully pressurized. Waite felt claustrophobic in the hopper, even with his face mask flipped up. He wanted to be outside.

Lasserman crouched by the hopper's instrument panel; his suit was linked to computers that projected data on a heads-up holographic display shimmering in front of him. "I am still getting anomalous readings from the EM sounder. It shows something large and artificial out there, more than just the VLF. And the infrared response makes no sense. Much too high. It's been dark for ten days now—everything should be very cold."

"Maybe our dust is scattering the signal." Waite clicked down his faceplate and switched on the suit radio, impatient to solve the problem. Why talk about it anymore when they had come all this way to do a hands-on?

Lasserman hesitated. "Dust should have settled by now," came his voice over the radio. "That cannot be the explanation."

Waite finished checking his suit and moved toward the hatch. "Well, as soon as Becky's ready, we can go outside and have a look for ourselves. If nothing was screwy, we wouldn't have come all the way out here anyway." *If you weren't willing to take any risks, why did you come to the Moon in the first place?*

Startled, Becky fumbled with her own suit. Out of the corner of his eye, Waite watched to make sure she went through the proper checks.

Lasserman nodded in response to his controls, adjusting his throat mike. "I am informing Mr. Dvorak that we have arrived and are still receiving anomalous signals. I will rig it so that they can observe the mission in realtime."

"Right," Waite said. As if the moonbase commander didn't have anything else to do. Or maybe he didn't. Jason Dvorak had

been in command of Columbus for only a few weeks, and his promotion had surprised himself as much as everyone else, especially Bernard Chu, the former commander. Maybe Dvorak did want to watch the repair activities.

"Ready," Becky said.

"Rog. We're going out now. Deploy the rover." Waite sealed the airlock and squinted at the blocky buttons on the control panel A green READY light blinked at him. Pushing his spacesuited thumb against the panel, he immediately felt his suit stiffen as the air bled out of the lock. A rush of warm air diffused through his suit as the heaters kicked on. Beside him in the cramped chamber, Becky Snow stood completely still.

"We'll get this straightened out in no time," he said for the benefit of the moonbase audience who would be watching the transmissions, and no doubt the hackers on Earth who loved to tap into boring moonbase jabber. The special-interest comm-channel, United Space Agency Select, had long ago stopped broadcasting news about routine mission activities.

When the hopper's outer door unsealed itself, Waite climbed out of the airlock. He held out a hand to steady Becky as she climbed down the ladder, but she kept her own balance.

Turning, Waite paused to assess the distance to the VLF. The rover would kick up some dust, but that little bit shouldn't cause too much of a problem for the dipole antennas. Even in the darkness, through a breach in the crater wall, he could see the wide and crumbled access road left behind by the construction vehicles that had installed the array five years before. It would be a quick drive down.

"Don't spend too much time gawking at the scenery," Waite said to Becky. He turned to see that she had already begun disengaging the rover vehicle from the hopper chassis. Lasserman had deployed the package while they were still in the airlock. The lunar rover bounced once on the moon dirt, or regolith, and began to unfold.

"All right," she answered and waited for him to get into the rover.

"We're heading out, Sig," Waite said.

"Roger that. I am reading everything from your suit cameras. You are relaying directly from the rover up to L-2."

"Isn't realtime great?" He just hoped that the moonbase people wouldn't muck around with his job out here. He was the one on Farside, and he would make the decisions himself.

Lasserman would have preferred to sit wringing his hands until Dvorak or somebody else told him what to do, or maybe even until Celeste McConnell made a decision back on Earth. If he had to wait for them, Can't Wait would die of old age before they got around to choosing the "most judicious course of action."

Waite paused while the rover's steering wheel popped out, then seated himself on the vehicle's framework. The light banks came on, spilling out across the path ahead of them.

The Moon at night was full of shadows, but starlight undimmed by any atmosphere glimmered down like ice-cold points. As soon as they passed over the lip of the crater, bouncing along the access road on the rover's wide tires, Waite saw immediately why the VLF array had ceased functioning. "There's something very wrong here," he transmitted, keeping his voice steady.

"I can see that. Unbelievable!" Lasserman's voice came into his ears. "I've already checked in with Columbus. Somebody is going out to get Mr. Dvorak right away."

That seemed unimportant to Waite. He stared down the sloping crater wall to the floor of Daedalus. Behind them a line of their own fresh tire tracks serpentined back toward the hopper.

Beside him, Becky leaned forward. "None of the archival photos looked like this."

"That's because the archival photos were two years old. You go ahead and gawk all you want."

In the starlight, he could see that two arms of the **Y** remained intact, but the third looked as if it had been bitten off. Directly next to the crater wall, a pit like a gigantic mine shaft plunged downward, a kilometer in diameter if it was an inch. It yawned like a giant mouth swallowing the floor, the VLF array, and every sign of human presence. Waite could not see the bottom.

Spreading out in translucent strands, a wispy structure extended up from the pit—ghostly arches of fishline, support