The Tedium of Maintenance

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The broken thing is a multiplexer / demultiplexer. You can call it an “MDM” if you’re in a hurry or trying to sound important. If you saw it at a garage sale, you’d pick it up with one hand, turn it over, squint at the identification plate, then put it back on the table with the other miscellaneous stereo parts. You’d assume it’s nothing remarkable.

Unfortunately, it is remarkable. It is one of two duplicate MDMs operating the high-gain antenna, transmitting data from the Aeneas spacecraft to earth and back. When this MDM failed, the backup took over. If the backup fails, Aeneas will fall back to low-gain antennas. This would be a bad thing. This non-operational MDM is making a lot of people very unhappy.

Ellen discovered the problem during morning maintenance. It’s bolted to the outside of the ship, nearby the antenna, and returned an error when she ran a maintenance query. She should make a note, then follow the prescribed daily routine; scheduled maintenance, swapping and cleaning filters, recording gas and fluid levels. Making notes and checking boxes on a clipboard. It’s an endless list of long-term and boring tedium necessary for the health of this ship. The antenna is broken, it isn’t going to get any more broken. Other systems are working and routine maintenance will keep them in operation.

The correct, but non-intuitive response would be to add the antenna as maintenance to be done during the spacewalk scheduled later today. But she doesn’t; there ought to be a way to fix everything from here, right now.

“Lou,” says Ellen Dietrich. “Please come to my location.”

“I’ll be there in five minutes,” responds Lou. The voice sounds like an adult woman, but it actually belongs to one of the three hull crawlers on-board the Aeneas spacecraft. They move around the outside, anchoring themselves to regularly spaced grab points. Crawlers are expensive mechanical crabs with manipulators in place of pincers. The alternative to repairs with a crawler is a human suiting up for a spacewalk, a complex activity requiring days of preparation and subsequent recovery.

Huey, the second of three crawlers, has an adult man’s voice, Dewey has a young boy’s voice. This isn’t intended to make them human. Rather, it provides the astronauts aboard Aeneas quick confirmation of which crawler they are working with. The crawlers do have a bit of artificial intelligence, but only enough to be able to plot the shortest route between two points, find the best grab point, recognize components, and perform simple actions.

This hasn’t stopped other (bored) members of the crew from using the crawlers to put on performances. The recording of Dewey and Huey performing “Who’s On First” has gone viral.

Ellen braces herself in the aft turret overlooking the stern end of Aeneas. A forward window provides a view of Venus, their destination. To her right is the recalcitrant MDM. The small room she stands in is filled with camera controls and monitors; it’s the most scenic room on the ship and a popular place to contemplate the universe.

“I have arrived,” says Lou.

When Ellen looks down through the top side of the window she can see Lou; at least, both of its eyes and one manipulator. It reminds her of blue crabs in Onancock, Virginia on the Chesapeake Bay. The crabs watched her from the shallow water, calculating the risk of danger from above against the reward of food at hand. They were in water deep enough to be out of reach, just like this crawler is out of reach.

She can see herself from the crawler’s video camera; it shows her behind the window. She is a thirty-something mom with brunette hair, standing against the one-gee acceleration. The window glass stands in for the surface of the water the Chesapeake Bay crabs must have looked through. She doesn’t think she was threatening, but the crabs back home behaved otherwise.

“Lou, mimic my hand,” Ellen instructs the crawler. She reaches toward the MDM; Lou does the same. Ellen reaches for the access door, intending to twist a handle and view the internal diagnostic panel. Lou doesn’t reach far enough.

“Lou, move closer to the MDM.”

The video lurches but Lou remains where it is. Ellen can see the crawler twitching, unable to reach the next grab point. It is snagged, but Ellen can’t see why. An inoperable crawler isn’t a big deal. With enough time, Huey or Dewey can be summoned to rescue Lou. Or it can be added to a maintenance EVA. This problem is becoming larger and for Ellen, more interesting. She puts down the routine maintenance clipboard and tries to get a better look at Lou’s rear legs.

Kim, her partner and father to Charlie, learned not to re-direct her obsessions. Kim was steady, a good partner for someone with an aversion to boredom and attraction to novel challenges. He gave her room to be detached and was patient when she tried to change him. She gave him intimacy, but not emotions. They built a child who was happy to live on earth, with Kim, at the parenting collective. Ellen was happy to be on the Aeneas, staring down a stuck crawler, broken box, and inoperable antenna.

Kim is a more hands-on parent than Ellen. On hikes, Ellen would be far ahead, assuming Kim and Charlie would explore and learn on their own time; Ellen wasn’t going to force education on Charlie, nor would she force enjoyment on Kim. More than once, when Kim and Charlie caught up to her there were harsh words about the “family” hike and Ellen’s lack of participation. Yes, a hike was for physical exercise; but it was also a bonding experience and a chance to share interests and viewpoints. By charging off, Ellen missed that experience. That was Kim’s view - Ellen disagreed; saw it as giving them space for unsupervised learning.

She needs more eyes on the problem.

“Huey,” Ellen says. “Move to my location.”

“I’ll be there in in ten minutes,” Huey responds. This seems like a long time - but it’s infinitely quicker than suiting up herself. The crawlers are methodical and know the shortest path from their garage to any point on the ship. She will just have to wait.

Accepting the flight to Venus was a ten-month commitment, plus a year of intense preparation and years of exhaustive follow-up. Kim chafed at this project, comparing it to her mode of participation in family hikes. She didn’t see the problem; Charlie had a great school, a great parenting community, and a great father. Kim had a monogamous partner with a good income, which provided him with the time and financial security to pursue his carpentry. Regardless, her departure was not a positive step forward in the relationship; Kim doubted the relationship would be intact when she returned.

She hadn’t heard from Kim and Charlie today and might not until the MDM and antenna issue was repaired. The lack of contact isn’t her motivation to fix the antenna; the challenge to fix the problem is enough all by itself. But she has a bit of time - enough to queue up a message.

“Hi Kim. Hi Charlie. I’m still out here, putzing along to Venus. Stuff is broken so I can’t send this right away.

“I’ve been thinking about our family. You’ve mentioned I’m distant and don’t seem invested in the relationship. Well - I’m certainly distant now - and will be for another year - but I think it’s wrong to say I’m not invested. I just want you to be free to pursue your life the same way I pursue mine.”

“I have arrived,” Huey says. Sure enough, a second crawler is peeking over the left edge of the window, waiting for instructions. Ellen pauses the message to Kim.

She nudges Huey to get a better view of Lou; through his eyes, she can see how Lou has jammed two legs into one grab-point, wedging itself in place and unable to release it’s grip.

“Huey, mimic my hand movements,” Ellen says. Watching from Huey’s perspective, she moves closer to Lou’s back leg and reaches out to grab the jammed leg. She can just touch Lou, but can’t get enough of a grip to free the leg.

“*Can’t free the crawler, but at least I can fix the antenna.*” Ellen moves Huey towards the broken MDM until it stops. Lou is blocking the grab points Huey needs. “*Curses, foiled again.*” she thinks.

If Kim were here, he would be silently broadcasting his frustration with Ellen and her unpredictability. Charlie would dive in, grab controls and flail towards a solution. She hated that about Kim, loved that about Charlie. She loved that Kim gave her space to fail, hated that Charlie’s energy forced her to act abruptly.

“Huey, move so you can see Lou’s backside.” Ellen tells Huey to move, then snickers. Is this an HR violation? Someone on earth will review this later and hopefully have a laugh. Huey makes no comment and moves into place.

Now Ellen can see how the tip of one leg has passed through the grab point and wedged into the clamp at the end of another leg. How this happened is a mystery, but getting the leg free is going to require three hands. Ellen wonders for a minute if she could just use Huey to give Lou a hard yank. It might work, or it might not, or it might bust something else. Tempting - but she makes the smart choice.

“Dewey, come to the right side of this window.”

“Are you sure?” Aeneas interrupts. “This will move all crawlers to one location. An accident may cause the loss of Huey, Lou, and Dewey.” Aeneas has a bit more smarts than the crawlers and is able to calculate risk/reward assessments. Aeneas, like Kim, doesn’t approve of Ellen’s increasingly risky approach to this repair.

“I confirm my request,” says Ellen. Again, the smart thing would be to include this as part of the maintenance to be performed later today. But she is obsessed and is willing to double-down on her solution. For the briefest of moments, she is aware of making a commitment on behalf of the entire project and crew.

“I will arrive in fifteen minutes,” Dewey pipes up. The juvenile voice synthesizes enthusiasm. Some engineer back on earth must be proud of this little tweak to an otherwise dry programming request. Charlie would be enthusiastic. Kim would not.

She fantasized about being less independent with Charlie, more compliant for Kim. “*Kim, what do you think? Should we fix this ourselves, or call in the entire crew for consultation?“* She could voice the request inside her head, but even in the privacy of the lab she couldn’t bring herself to say it out loud. She begins to add to the letter she started, but makes no headway.

“I have arrived,” says Dewey. This crawler is right next to the MDM and could easily open the panel; Ellen instead chooses to work on Lou first.

“Lou, mimic my hand.” Ellen uses Lou’s front manipulator to grip an anchor point.

“Huey, mimic my right hand. Dewey, mimic my left hand.” Ellen takes a minute to get accustomed to watching Huey and Dewey’s video feeds as well as moving their arms. It’s disorienting; similar to writing with your left hand instead of your dominant right hand. Slowly, and with help from Dewey and Huey, she untangles Lou’s legs from the anchor point.

Lou pulls herself forward and away from the other two crawlers. *Forward and away…* she thinks. Is she pulling forward and away from Kim and Charlie? Or is she giving them room to express themselves. Kim would say the former. Charlie is still to young to have made up his mind.

“Huey and Lou, you may return to your garage,” says Ellen. The two crawlers carefully wander off towards their home on the hull. Dewey remains behind.

Ellen watches the two leave, then speaks to Dewey. “Dewey, mimic my hands.” Opening the MDM, she can see there is nothing visibly wrong. Dewey will have to bring it inside where they can use the diagnostic lab tools. Not a waste of time, but not a success story either.

Dewey places the MDM on its back and moves out of sight towards the equipment airlock. Before she goes, she completes the letter to Kim.

“I’d like to keep our family moving forward together - not away. Is that something we can do from 100 million kilometers?”

Ellen picks up the clipboard and resumes the tedium of maintenance. It’s painful, but important. Something she is learning.

Hutch comments:

1. A number of recent movies and series have tried to connect space and family dynamics. I think of “Away”, “Interstellar” and “Lost in Space”. Is the distance of space a hurdle that is too big for family to overcome? Or is it a metaphor for what is? Should parents not qualify as astronauts because they can’t make the impersonal, tough choices? Etc… One question I have about this is are they just movies about relationships set in space? Or is there something about the sci-fi genre, or outer space that is integral to that theme? We never wondered about Sigourney Weaver’s family in Alien, though the spaceship was named “Mother”. Other older space movies seem to suggest that it’s better if astronauts don’t have family ties because of the risks. Is your story somehow part of this larger conversation? What does it add to it?

2. Interesting that in your story their destination is Venus. You never mention Mars. Is this story about family dynamics or about male/female relationships and stereotypes? Ellen shares some “male” characteristics with her son, but not her husband “Kim”. Not sure you need to mention Mars. But it occurred to me.