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SWIFT ENTERPRISES PRESENTS

Ken Horton— GeoSynchronicity

By T. Edward Fox

No man other than Tom Swift himself is more identified with the Swift's Outpost in Space than Ken Horton. Ex-military man, Ken was one of Tom's first tested and trained astronauts during the planning stages for the giant space wheel.

Ken was the obvious choice to take over as station commander once the wheel was operational. A natural leader and someone whose skills and eagerness to learn make him irreplaceable, Ken took to the job immediately.

These are Ken's own remembrances of some of the major events that went into the building of the station as well as things that have occurred in the meantime.

Starting day one, Ken has spent the maximum time allowed at the station. He loves his job and considers himself to be among the luckiest people on Earth.

Or, above it!

This book is dedicated to the people who pioneered space. No matter what their nationality, no matter what their missions, these brave men and women strapped themselves into giant explosive devices and allowed the lowest bidders to blast them into space and history. Many survived, and a few did not. We salute all of you.

Ken Horton— GeoSynchronicity

FOREWORD

What can I say?

I've led a life blessed with opportunities—some I have actively pursued and some have literally fallen into my lap—to do the things I've wanted to do. I work for the best organization on Earth and for the two best employers on that same planet.

So why, you might well ask, do I not spend more time on the actual planet? That's an easy one.

My job is, and I hope it will continue to be for a great many more years, up in space. I am the commander of the Swift's Outpost in Space, Earth's second major space station and its only privately owned one. At any one time I have between thirty-seven and forty-one men and—at least as of now—women who depend on me to make safe and sane decisions that keep them alive in the hostile vacuum of space.

We work hard, but the joys are far more significant. We float above famine, war, the stupidity of politics, and all the other man-made ills that plague mankind. We have jobs to perform, ones we all believe in. We do nothing that smacks of the military. We have a crew of people who work together like a fine machine and live together like a very close family.

A small girl once asked me if I worked up in heaven. I told her that it wasn't heaven, but as close as a living man might get.

Ken Horton

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CHAPTER 1/**In The Beginning**

I SUPPOSE that I am one of the luckiest men in the world; certainly I am one of the luckiest men in the United States. I know for certain that I am the luckiest man to have ever hooked up with a young man by the name of Tom Swift.

From the time I was a small boy watching the sky at night, I dreamed of “going up there.” When my teen years proved to be somewhat of a bore to me and I sailed through high school in three years, I was left with a choice.

Go to college with no specific idea of what I wanted to do with my life, or take a chance on the military.

Being only seventeen, my father had to sign my life away at the recruiting station. They had me take a test the following Saturday morning, and by that afternoon I was standing in front of a U.S. Air Force Major who was telling me that I had something called “aptitude.”

I swore to the man that I was a clean boy with nothing like that, and my mother would just die if she heard otherwise.

He laughed and laughed, eyes twinkling, so I knew he wasn't laughing at me—specifically. It must have been a misunderstanding.

He eventually explained what he meant. It turns out that I had answered each and every question correctly. Nobody had ever done that in the three years they had been administering that test, he told me.

“I've just got one question for you, young man,” he said, turning completely serious. “What is it you want to do? In your wildest dreams, what do you want to become?”

I had to think about that. It was the same question my parents had asked me when I was completing school early. The preacher at our church asked that. My uncle and his wife

wanted to know. Even my high school principal had asked when I told him I didn't want to come back for my senior year just to take a few easy classes.

I had no answer for them then, and I wasn't too sure I had any better answer standing there.

My eyes wandered around the Major's office. I was struggling to come up with something until I focused on a photograph hanging behind him. It was the Air Force's precision flying team, the Thunderbirds.

All I could do was point over his shoulder as my heart began to race and my entire body began to feel like it was on fire.

He didn't even need to turn around. He knew what I was looking at. He smiled.

“It may interest you to know that only about one in a hundred men who ask for assignment to the 'Birds gets that assignment. You have to be the best of the best. Do you think you've got it in you to be one of them?”

Nodding, I said in almost a whisper, “Yes, sir. I do.”

Things went amazingly well for me. They put me through school—I opted to not go to the academy—and then swore me into service the very afternoon I graduated.

The only problem came when I had to take my first flight physical. It was the first time that doctors had me stripped absolutely naked while they checked me over from top to bottom... and below.

It was the below that almost did my hopes in. You see, I have this small birth defect. My great toe on my left foot is only about three-quarters as long as it should be. They “hmmm'd” and “wellllllll'd” and looked things up in books and made a couple of phone calls before deciding that it wouldn't impact my ability to press the pedals in a fighter jet.

It was almost two years later that I finished all of my flight training and earned my wings as a Captain. I flew with the Air Force for a number of years before a cross-branch offer took

me to the Army Signal Corps. I never did request a Thunderbird assignment. When I left the Corps I took some time off before looking for a job, pretty much unsure of what I might have to offer any prospective employer except my enthusiasm.

In fact, now that I come to recall, it was that short toe and my vacation that got me where I am today, Commander of the Swift Outpost in Space.

You see, Tom's sister, Sandy Swift, and his girlfriend, Bashalli Prandit, spotted me on a beach one day and saw that short toe. They had been victims of a theft earlier and the culprit had left footprints in the sand featuring, wait for it, a short great left toe.

You can't fault them for thinking the worst of me. It all worked out for the best. My toe gained me an introduction to Tom Swift and that led to him giving me the opportunity to become an astronaut, one of the first of the Enterprises astronauts other than Tom and his best friend, Bud Barclay.

Tom devised tests and procedures and even a chamber that simulates zero-G forces that anyone who wanted to be part of the outpost project had to pass. I was the first one through, so he made me the man in charge of the non-medical tests for all subsequent people coming through.

We tested and trained almost fifty men. Actually, we tested eighty-three and accepted fifty. The others just couldn't cut the mustard on one or more of the tests. Usually it was either for a purely medical reason, and Doc Simpson was the deciding vote there. But, as happened with a few, they either had trouble with the G-forces involved in the centrifuge test—they passed out or go so disoriented they had to hit the "STOP" button—or they had problems with working in the absence of gravity.

I'm not sure if any of you have ever had a rip-roaring inner ear infection, complete with almost total case of vertigo and severe vomiting, but that is exactly how bad some people were affected by the lack of any discernible down or up.

We also had one guy who proved to be a man with a criminal past. It was determined that he was not a good candidate for the job.

Along with a construction crew of over two hundred, we build the spaceport on Loonau Island in the Pacific Ocean and the underwater launching pad and winch system, all the time keeping up our training for space flight and gaining the skills to put the massive space wheel together.

Thinking back, I suppose that we fifty were doing, and continue to do, the work of a team three times the size. It is a source of great pride among us. In the two years since we complete the wheel, only one man has left the "service." And, that was only because his wife took ill and he needed to be with her and their family. When she passed away, he decided to remain dirtside to take care of their two kids.

Can't say that I blame him.

We still keep up now and again, and I've let him know that any time he wants to come back up—for vacation or for work—he is welcome. That's the way it is with us. We started out as fifty separate men and became a solid family, fifty strong.

I arrived along with eleven others in the first three of the rockets launched from underwater. Now, that's a system! It's like reverse bungee cord jumping, only for us it was getting winched underwater many, many fathoms, and attached to a very buoyant casing that split into four parts and was ejected just as we got back to the surface.

The speed achieved was a little more sudden than a traditional all-propellant launch, but it did away with the need for a first stage. And, as anyone who's read anything about rockets knows, it takes the first stage just to get its own weight and the rest of the rocket off the pad and traveling with just a little forward momentum. In the Saturn 5 moon rockets that meant that greater than half the total weight was just the propellants needed for lift-off.

Tom's method had us hitting the surface at better than one-

hundred-eighty miles per hour and with enough inertia overcome to let the rest of the rocket burn about one-fifth the total fuel per launch that anything heading skyward from Canaveral or Baikonur.

Everything launched ended up in what most people call geosynchronous orbit, just about 22,300 miles up. We are actually in what is known as *geostationary* orbit. It is a little higher and it keeps us directly above the same point on the equator all the time. Geosynchronous orbits keep you over the same basic area but you actually do move around a bit. For our missions we need to be right in one spot 24-7-365.

We spent days assembling the components for the central hub. That had to be ready when the rest of the rockets arrived. All twelve spokes would be the empty lower stages of the rockets. Propellant tanks would be removed and bulkheads installed and sealed. Things like hatches as airlocks had been built right into the rockets, and the connecting ring between the propellant stage and the control capsule doubled as the connector to the hub.

Then, and in a concentrated effort, all of the spokes were moved into place just inches from their connecting points, one at a time until all but the final one was ready to dock. We had problems with that last one. It just didn't want to get into the proper attitude, level and rotational position.

But, with the skipper's guidance—you *do* know that we all call Tom, 'skipper,' right?—it was eventually aligned and all of the spokes were connected, sealed and the hub officially pressurized.

Week after week were necessary to bring up another twenty or so supply rockets, many just computer-controlled so we didn't accumulate too many people up here, filled with everything from computers, assembly lines for the Swift Solar Batteries we make, all the equipment that the television networks rented space for, and so on down the line all the way to toilet paper and pens. No pencils. Can't have the ultra fine graphite floating around, you know.

It took a lot of good men a lot of time, but we officially opened for business with a dedication ceremony just one day later than Tom had originally hoped for.

Unofficially his father, Damon, told me he expected it to require at least an additional month. He was happy to be wrong about that.

Oh, we had a few problems getting things built and up and running. Doc Simpson from Enterprises had trained about one out of each five men in advanced first aid techniques. That came in handy as we had several smashed fingers, a couple broken bones and numerous cuts and bruises.

Even without room for any hospital facilities, Doc had outfitted one small cubicle with the basics including one fold down cot that was on a pretty nifty mount. Fold it down from the top and it was a desk. Fold it up from the bottom and it was a hospital bed complete with a vacuum arrangement that keeps a patient down and not floating off.

Food was an issue for us. We had planned to rotate the station at a speed that could give us about half Earth gravity at the ends of each spoke. The kitchen and mess hall was supposed to be half way down one spoke. That still meant that the hub would have almost no gravity, but it all became moot when we found out that the alignment of all the television broadcast equipment and the optimal aiming of our solar collector array really needed the wheel to remain stationary.

Goodbye rotation. Goodbye any slight gravity.

Tom assures me that in a few years he wants to add a second set of spokes to the underside of the station. Basically it will be a second full wheel like this one. "Those spokes will be able to rotate while the upper spokes and the hub remain still," he has told me on more than one occasion.

We'll see.

As I was saying, food was and is an issue. We grew very tired of tubes, plastic bags and sippy cups pretty quickly. Leave it to Tom to come up with a solution in his sleep. He actually

dreamt up a solution involving generating negative ions that come pouring out of one side of our dishes and cups, and flow across to the other side. Everything inside gets a slight negative charge as well, so just like two magnets, similar charges repel and keep food and drink inside and not floating around.

Easy once you think about it. If your name is Tom Swift, that is.

We enjoy some great food, most of it either fresh coming in on one of our three supply rockets each week, or fresh frozen. We keep emergency rations on hand, but those pretty much remain in their sealed boxes.

And, those rockets that bring up supplies also bring the components for the solar batteries and then return to Earth filled with fully charged batteries plus any of our waste that can't be recycled up here.

All in all, we don't have it too bad. Tom and Doc even developed some exercise equipment and special suits that give us a workout in a simulated Earth gravity. We all stay in shape.

Did I mention that we all love it up here?

CHAPTER 2/

Sheathing the Armadillo

THREE MONTHS after the completion of the space wheel we had our second run in with a high-speed object from outer space. During the first one we spun at breakneck speed until Tom was able to get the—supposedly—automatic retro rockets to fire to reduce and then stop our out-of-control spinning.

Men and equipment were bashed and bruised, but we survived eventually getting the wheel back into its proper position and completing construction.

We were not so lucky the second time around.

I remember the entire event as easily as I remember exactly what I was doing when I heard the devastating news that President Kennedy had been shot. Some things just get drilled into the center of your brain and are always there.

The second sitting for lunch had just finished and the duty cooking crew, all two of them, were cleaning up. The solar battery factory was performing their weekly cleaning of the concentrating mirrors so that maximum solar power would be concentrated onto the bubble-mounted receiving sphere.

Did you know that we turn out more than three thousand Swift Solar Batteries in all seven sized and configurations each and every day? One thousand every eight-hour shift times three shifts. You see, our mirrors are almost never hidden from the Sun so we can charge batteries around the clock.

Anyway, I sat down at my computer to make a few notes in the station log. I had typed, "All checks made. Station air tight and—"

BANG!

Everything went flying. I went butt over teakettle and right up into the ceiling smashing my right leg against a bookshelf in the process.

The station went from zero rotation to—what we discovered later—one full and very wobbly rotation every seven seconds.

Alarms went off including the decompression alarm, our worst nightmare. I think you can figure out why.

This time the automatic rockets began blasting in short, measured bursts and our rotation was stopped inside of three minutes.

A minute later and a repair crew was able to get to spoke nine and slap a sticky patch over the thumb-size hole that had pierced both the outer and inner hulls right near the end plate.

If the danged thing had been just two feet farther out, it would have missed us.

The vacuum monkeys, our nickname for the team of specialists that can get outside and crawl over to any part of the wheel in just seconds, hit the airlocks and checked out the entire station. They spotted the obvious hole in spoke nine and got an outer patch epoxied into place. It would be permanently arc-welded in place later in the shift, but the monkeys still needed to check for any other holes.

They found two pin-size holes in spoke ten and got those filled.

They found another small hole in spoke three that must have happened once the wheel started spinning because it was a lateral tear through about a third of the thickness of the outer skin. That, too, was filled with a material that cures in the chill and vacuum of space in seconds because it is activated by ultraviolet light, and the Sun sends that stuff out in spades.

It was what they found in between spokes five and six that ruined our day.

When I was called to the airlock in the central hub located near spoke four, what I saw stopped me cold.

The crumpled form of one of our men, faceplate smashed completely out of his helmet, lay there with eleven men standing around it in silence.

It was Alex Ronson, our British-born technician assigned to both the monkey squad as well as the solar team.

“He was outside polishing mirror assembly six when it hit. He was the last man out there. Zimby Cox had just entered the airlock and was getting ready to reel him in,” the team leader told me.

Zimby, standing there with tears streaming down his cheeks, still in his full suit, spoke up. “I reached in to hook his line to the reel when it jerked out of my hands. I couldn’t get my head up to see. I got slammed pretty hard into the bulkhead. The hatch auto closed and I was stuck in there until the station computers unlocked me three minutes ago. If I’d just been quicker—” His voice choked off.

“Zimby,” I told him. “Even if you had hooked him up, he would have been thrown around and would have ended up like this. The line might have even torn his suit right off. It wasn’t your fault. We are just too damn vulnerable to those meteorites!”

When I made my call to Tom and his father, Damon, I could barely get the words out I was so totally shocked. I had never lost a man in the military or up here. In spite of their reassurance to me—as I had reassured Zimby—the words fell hollow on my ears.

“We’ve got to have some sort of protective cover, Tom. Damon. This is twice we’ve been hit hard enough to lose air and get spun around. Can’t you two put your heads together and come up with something?” I was almost yelling.

Bless them. They took the high road and were calm and collected. After a few moments during which I cooled down a little, Tom promised that he would come up with something.

And, something he did come up with.

A month later a special supply rocket arrived and was “parked” about a hundred meters off of spoke twelve. Its positioning emitter was aligned with the receiver at the end of

that spoke and its computer left to maintain an exact positioning using tiny microburst jets of compressed nitrogen to keep it to within one centimeter of where it started.

Tom came up along with Bud and several of Enterprises more burly workers, like Hank Sterling, the following day. Together with five of my men they opened the side of the supply rocket and maneuvered out the first of several huge rolls of something that shimmered and seemed to flow like water right in place.

Donning my suit, I joined them. When I arrived at the roll I was surprised to find that it looked to be made up of millions of small white metallic plates and connecting rings.

“It looks like some sort of giant chain mail, skipper,” I told Tom. Through his tinted faceplate I could see his lopsided grin, and his helmet nodded.

“Right in one,” he radioed. “It’s actually a five part system. These plates are made of Durastress that has been embedded with magnetitanium. That almost doubles the strength as well as provides reflection so that heat can’t get through.”

“And the rings hold those together. Right?” I asked.

“Right. There is another identical layer of the plates and rings on the under side as well. But, the secret is in between.” He reached over to one corner and gently pulled back the top later. Underneath was a shiny, orange layer of something that looked like silicon sealant.

He explained that the center was a new substance based on a semi-liquid form of silica—not silicon—that was only pliable in the presence of a specific electrical charge.

“We’ll hook it up to a new solar cell that will be mounted to the end of each spoke. Each will provide enough power for that spoke’s covering as well as about one-twelfth of the hub.”

“Top and bottom?”

“Nope. You’re not going to get hit by anything coming up

from the Earth that you won’t see in plenty of time on your scopes. This is for the too-fast-to-see and too-small-to-detect stuff coming from space. Anyway, the center layer will act like a catcher’s glove. Once a small computer detects that something has hit, it turns off the electrical charge and the entire sheathing gets very stiff. It can slow down and stop anything up to baseball size in less than three inches or travel.”

Over the following seven days Tom’s team and my monkeys worked to unreel and shape—under electrical power, obviously—and to mount our new protective covering on all twelve of the spokes and on the upper parts of the hub. Standoffs were welded every couple of feet and the covering, Tom was calling it ArmoHide, was attached to them.

Zimby Cox, who had gotten back some of his sense of humor, said that it looked more like “armadillo hide” so that was the name that stuck.

In the months following its installation, the ‘hide’ stopped another two strikes and only showed minimal impact damage. We were able to recover the pieces of space debris. Both were about the size of “pee-wee” marbles and only weighed five and seven grams: not even a quarter of an ounce.

Without the hide, we probably would have been punctured, again, and certainly would have been spun like a top. As it was, we were knocked a couple yards off of level by one and spun a quarter rotation by the other. Both were quickly rectified.

The most important thing is, though, that we have lost nobody else. No bumps or bruises either.

On my first rotation back to Earth a few weeks after the hide installation, I made a quick visit to one of Enterprises’ departments and to see Arv Hanson, the man who makes all of Tom’s miniature models.

When I returned to the station a month later—we all do three months up and one month down—I took with me a beautiful miniature of the space wheel, nine inches across. Engraved in the magnetitanium surface of spoke six, Arv had put:

In loving memory of Alex Ronson
Astronaut, Swift Employee and Friend
May he rest in peace. We will be
all the less for his loss.

I personally attached it to the outside of the wheel where it will remain until the day this beautiful station is decommissioned and returned to the Earth.

CHAPTER 3/

Man Overboard

YOU NEVER can count on things remaining absolutely static around here. In fact, it is the absolute knowledge that things will change that keeps people on their toes. You have to be; when you are floating at 22,300 or so miles above the equator with even the quickest help several hours away, not being able to take care of things on your own can be fatal.

We were about to celebrate the first anniversary of the completion of the wheel when word came up that one of our most equipment-dense spokes was in dire need of replacement.

We house the major broadcast equipment that the television networks use to feed all of their affiliate stations. The networks beam it up here, we add the necessary security coding so that nobody can steal the signals, and then beam it all over North America.

There is so much equipment in that spoke that only a small corridor exists in the outer eighty-five percent of it so that technicians can get in there in case of a needed repair or adjustment. The rest of the spoke contains repair parts and a small office.

The problem arose when the governments of The United States and Canada decided that the broadcast standard in North America was in need of change, and that meant that all of the equipment up here would be useless in less than three years.

So, it was decided to replace it. Sooner rather than later, and with equipment that was more compact and easier to repair, if necessary.

By "it," I mean the entire spoke. The experts figured that if we did it piecemeal, our ability to receive and transmit the signals that feed North America's appetite for entertainment and news and sports would need to go off-line for at least ten

hours every day for more than fifteen days running.

Not acceptable.

Tom came up with the idea that just rigging an entirely new spoke with everything inside and then strapping on a couple of booster rockets to get it up here would be more economical as well as mean very little dead air time. The old spoke would be unhooked, dragged a little ways away, and the new one attached, all during a three-hour burst of work.

That was the plan and it almost came off without a hitch.

The day before the arrival of the new spoke, Tom, Bud, Doc, and five others arrived in the *Challenger*, Tom's giant cube spaceship powered by his remarkable repelatrions. His plan was to help with the final preparations for disconnecting the old spoke and the quick turnaround installation of its replacement.

Starting within an hour of their arrival we assembled the construction team and began our practice sessions. We gathered in the hub and did several float-throughs—they would have been walk-throughs in any place with gravity—to get the sequence of steps straight in our brains.

After dinner we donned our suits and exited through four of the airlocks. Once outside we went through everything once again with Tom leading the way.

He had us gather in the shade of the hub while he gave us some verbal notes.

“Let's go through it one more time,” he suggested, “before we quit for the day. I'm going to move off a hundred meters or so and just watch and time everything. Ready?”

We all nodded, then the radios beeped and the station communications man called out, “Commander Horton? You're needed in radio. Message from Enterprises. Do you copy?”

“Yes I do. Be in in three minutes. Tom? Can you and the team do this without my interference?”

He laughed. “Sure. See you back inside.”

I returned to the hub and took the radio call. It was from one of our suppliers who needed my permission to short the next shipment of voltage regulators for the solar batteries. They had a quality control issue and could only promise eighty percent of our next order. We had ample extra on hand so I agreed and was just signing off when a call came in from outside.

“Man over... ah... overboard! Man overboard! One man adrift off of spoke three. Ninety feet out and increasing. I repeat, man adrift off spoke three. Looks like a suit tear. Get out there!”

I leapt to my feet, something I should have known better than to do. That move only served to launch me toward the ceiling where my head collided with some of the piping and wiring harnesses that are mounted throughout the station. Rubbing the growing bump, I heard the next words that made my heart almost stop.

“It's the skipper!”

Holding my head I tried to think. There was no way that anyone inside could be of any help out there. Unless the assembly team could get to him—and assuming that Tom could control that tear—they might be retrieving a body rather than rushing in an injured man.

I waited by a port until I could see the team speeding back with Tom's limp suit. As they closed the airlock and pressurized it, I picked up the station intercom mic and yelled out, “He's onboard! Everyone clear a path from spoke eight to the infirmary! Doc Simpson? You'd better already be there!”

By the time I drifted to the infirmary, Doc and Bud were stripping Tom out of his suit. The entire back of it seemed to be torn open and Tom's back was a nasty, livid purple.

“He's got a pulse!”

I've never been so relieved to hear four words in my life. The next few minutes were spent in examining Tom and getting him outfitted with an oxygen mask.

“His backpack was pretty mangled. Must have taken a

meteorite. It ruined the pack but didn't go right through him," I told Doc and Bud, who was performing chest compressions to aid in Tom's breathing.

Ten minutes later I took over for Bud. He was beginning to look exhausted. It's a lot more difficult to do something like that in zero-G. You have to hold on to something with your legs while you provide the downward force.

Something was going through Doc's mind. He was standing to one side with a far-away look in his eyes. I began to worry whether he was trying to find words to describe how dire Tom's situation was.

"Don't worry, Doc. He's alive now and we'll keep him alive."

"It isn't that, Ken," Doc replied, refocusing. "I need to get a look inside his lungs but we don't have the necessary tool." He described what he needed. It rang a bell in my very sore head.

"Take over, Doc." he moved quickly and took over the compressions. "Be back in a couple minutes," I called over my shoulder as I headed toward one of the supply compartments.

I came back and handed him a flexible camera scope. We keep several around to look behind and inside of equipment that we can't or don't want to de-rack. They can be bent, twisted and maneuvered with simple finger controls and have both a camera and a light on the end.

He was flabbergasted, but recovered as I explained about why we had them. He wrapped it in plastic and pushed it gently up Tom's nose and down into his lungs. I assume he liked what he saw because he had a smile on his face as he was pulling it back out. According to him there was damage but he was now certain Tom could recover from it.

I took back over for Bud who was looking really ragged. He was panting and was red in the face. As he recovered over in one corner of the small room, Doc mentioned that we might have to keep this up for hours or even days. I asked him to explain what he needed to automate it. He did.

Once I realized how simple his request actually was I asked Bud to take back over and I headed to our machinery shop. On the way I recruited five men to spell Bud and Doc until I could get back there.

It took several hours, but I came back with a pneumatic armature that I figured might be able to do what we had been doing. In case I forgot to mention it, while the oxygen mask could inflate Tom's lungs, there was no gravity to pull the chest back down. That's why we were doing it manually.

Doc looked my device over and tried it out, asked for a few changes, and I went back to the shop. When I returned we set it up—a plate to go under Tom's back with a vertical arm that held a horizontal, padded plate and an air pump to move it up and down—and turned it on. Doc adjusted it after I showed him the simple pressure valve setup and soon, between that and the oxygen mask, Tom was breathing at about ten breaths per minute, the maximum Doc figured his damaged lungs could manage.

That simple device along with having Doc's expertise, kept Tom alive and on the road to getting better by the hour. In just a couple days he was breathing unaided so we were able to pack him into a suit, get him over to the *Challenger*, and down to Earth where he recovered in Shopton General for the next couple of weeks.

Doc tried to make a big fuss with Damon about how I had saved Tom. That's bull. Doc did it. Bud helped. I just supplied a bit of mechanical know-how and my men made it happen.

But, that's the way it has to be out in space. You can't just pick up and drive to the mini-mart when you need a gallon of milk, and you can't call an ambulance when someone has to go to the hospital.

We've had a few close calls over the months. Nothing as serious as losing Alex or almost losing Tom, but there have been times when I have wished for some sort of miracle transporter beam to get people to the surface in seconds rather than hours or even days.

I was talking to Tom about that a month and a few weeks after his close call. He had been pretty busy with a number of projects and is getting ready to take another trip deep beneath the surface of the Atlantic Ocean. When I mentioned something that might be a nice addition to the outpost, he agreed.

“I’d been thinking of some sort of emergency evacuation vehicle, Ken. In fact, I’ve got Arv Hanson working on a full-scale test model of an evac ball. It will be about four feet across with a hatch taking up about a third of the surface. Anyone who needs to get back in a hurry can climb in, curl up, and the whole thing gets ejected back towards Earth. It will be made of Tomasite so it will withstand the temperatures of reentry, has a drogue and final parachute that pop out automatically, and even has servos to pull on the steerable chute lines so the built-in GPS can get it as close to civilization as possible. I figure if I can get all the fine details sorted out that it will mean anyone can be shipped back to Earth in under one hour, start to finish.”

To tell you the truth, it sounds a bit cramped. Even claustrophobic for some people. I’m fairly certain my big bulk wouldn’t fit into something like that, but it shows that Tom is thinking of us.

We’ll see what happens.

By the way, even though Tom was up here injured, we stuck to the schedule and got the old broadcast spoke pulled back and the new one installed and running in two hours, fifty-one minutes and eleven seconds. Start to finish!

You probably slept right through it. Most people did.

CHAPTER 4/

The Lady Arrives

WHEN NASA and the Russians were launching people into space in dinky capsules and later in shuttles and those EuroMover space delivery trucks, it started out as a man’s world but then quickly began including women.

Well, at least the Russians started early. The U.S. seemed to feel that it was a boy’s club up here so it took quite a long time to get to the point where we stopped thinking of women as delicate flowers and treated them as equals in space.

Can you imagine the coup it might have been if a woman were one of the first two on the Moon?

Swift Enterprises was both a leader as well as a latecomer to coed space crews.

While Tom took not only his sister, Sandy, into space fairly early on, he also took his girlfriend, Bashalli, his mother, Anne, and even several female doctors and physicists when he went to Little Luna, the phantom satellite that was placed into Earth orbit by Tom and Damon’s space friends and almost became the site of a war between nations.

That was months after we completed the space wheel, but it took the better part of fifteen months before our first female crewmember arrived.

Boy, oh boy, what a piece of work she was.

Nathalie Stadleman. A dynamo from the Pacific Northwest, daughter of the man who owns and processes better than half of the cherries that become those bright red maraschinos, and a woman with an ability to size up any situation, figure out what is right and what is wrong, and then give you her opinion.

Her only problem is that she lacks what are sometimes called ‘people skills.’ Her opinions pretty much all began with, “Now, the thing you are doing wrong is...”

Chow Winkler came up a few weeks after she arrived to spend a week cooking for us and ended up leaving us five days early. He absolutely detested her.

They had several run-ins on his first day up here that included him yelling and her coming to me to complain about his attitude. She seemed to fully expect everyone to see her way as the best way and to change. Chow isn't the sort of man you try that tactic on.

Come to think of it, very few of us up here are, either.

Now, I'm use to a bit of complaining from the regulars up here when it comes to a newbie. Newbies tend to get in the way and to try to do things by some mythical *book* rather than watching and learning how we do them.

The men who've been here for a while have earned the right to call themselves Wheelies. It takes at least a full rotation of being stationed up here, rotating for your break month back to Earth and then coming back up, but you are considered a Wheelie from that point on.

Newbies get kidded and even have pranks pulled on them. Most take it in stride and everybody gets a little closer.

Nathalie Stadleman didn't take to it at all from moment one. She came out of the airlock and announced to anyone within hearing distance, "My name is Nathalie Stadleman. I only answer to Nathalie or Miss Stadleman. If anyone thinks they are clever and try to give me a nickname or change my name into something it is not, I will report you to both the outpost commander as well as to the Swifts. Any questions?"

A lot of people had questions, but felt it better to give her a day or so to acclimate and figure out that we work well together and not apart.

Three days came and went, then five. By day eight I had men coming to complain about Miss Stadleman and her way of speaking down to people. Everything turned into either a complaint about the way someone was doing something or it became a source of a mini lecture on how she saw it should be

done. She wasn't a teacher but she made a lot of people feel like she was addressing five-year-olds, not seasoned professionals.

Nathalie Stadleman was not shy about telling people that she knew better, and that she knew that she knew better.

I had to take her aside twice in the first ten days to try to encourage her to consider how people might take what she was telling them and the way she was communicating it, and to perhaps rephrase how she was speaking to people. It didn't take.

Now, I don't go crying to Tom or Damon when things go a bit odd up here or times get difficult. They pay me to take care of things on my own. What sort of commander am I if I can't and don't get my people to work together and to play nicely with each other?

To my surprise, Nathalie was completely quiet for two days and I was thinking that my latest talk had done some good, only to discover that she had developed 'station laryngitis,' a complaint caused by the very dry air we have to use to keep out any hint of moisture damage to sensitive equipment.

She spent one day in the small bunkroom we had fashioned to accommodate her, and the next day she floated around handing out notes to a lot of men with things she had thought of while resting.

That was day one of what I'd prefer to forget, but will remember as the start of, "I want to go back to Earth" conversations. More than fifty percent of the male population of the wheel came to me within one week with similar requests. Most wouldn't look me in the eyes when I asked them for their exact reason. I guessed it right off, but I would have thought they might level with me. In truth, nobody wanted to be on the station while Nathalie Stadleman was here. She was making life and work miserable for everyone.

I was about to break my own code and contact Damon for advice when a radio message came through. Chow Winkler, chef extraordinaire, wanted to get his flight time in and would

be coming up the following day in the regular supply rocket.

And, he was bringing lots of good food. Whenever Chow arrives, morale soars. He brings new dishes and old favorites, specialties for celebrations and special events, and the odd beef rib roast and turkey.

I announce it to the crew that evening expecting smiles and positive comments. It fell on apathetic ears.

Oh dear, I thought. This is not good at all!

Chow arrived, complete with foods, for a seven-day stay. He left after two returning in the same rocket he arrived in. As he was suiting up I cornered him, asking for his reasons.

“That consarned woman ya got here is drivin’ me loco. Evidently, *I’m* not doin’ anythin’ right, even in my own kitchen. She has a better way. *Her* family didn’t do it like that. I need to change *my* ways. Well, Kenny. I’m tellin’ ya this. She is a misery and thar’s no two ways about it!”

Late that evening I received a call from Damon asking me what was going on with Chow. “He was suppose to be with you for a week, Ken. Now he’s back here and madder than a wet hen.”

I filled him in on Miss Stadleman and her attitude. “I’ve been trying to take care of it as gently as I could, Damon, but she isn’t the type to listen.” I didn’t tell him that most of my men were ready to evacuate the station because of her.

“Well, I’ve had a talk with Chow and given him some advice. He’s agreed to come back up day after tomorrow. Just give him some leeway and let him see if what I told him works. If not, then you have my permission to fire Miss Stadleman and ship her back down. We can’t have any one person destroying the good working and living relationships you have up there. Those are much more vital than one employee.”

Chow arrived with no additional foods, and with a grim look of determination on his face. “Sorry ‘bout desertin’ you, Kenny. Just got my feathers ruffled a bit. I’m a grown man and I kin

take anythin’ that filly dishes out.”

With that, he floated down the hall, through the hub and into his little kitchen in the adjoining spoke.

I gave a quiet order to several men to keep Miss Nathalie busy and to not let her near Chow unless she made a break for it. I couldn’t order them to restrain her, but I was tempted.

That lasted about one hour before the smells of Chow’s cooking began wafting through the ventilation system. Within minutes Nathalie was seen heading toward the kitchen.

I took a deep breath and headed that way as well. My hope was to keep Chow from killing her.

She was floating just outside of the doorway, making some notes on her ever-present pad. Finally, shoving her pen into the back pocket of her jumpsuit, she pushed off and into the kitchen.

“What the heck do you want?” Chow’s voice boomed out. He did not sound happy.

“Mr. Winker,” she began.

“That’s *Winkler*, little missy, an’ you *know* that. Yer just tryin’ to rile me an’ I won’t sit fer it!”

She let out a long and overly emphatic sigh. “Fine! Mr. Winkler. I’ve been watching what you do in this little kitchen, and while the men here may think that you are a godsend, I can tell you that as far as I’m concerned your exceptionally small set of recipes—”

She got no further than that. Chow had had enough. As I watched from down the hall I saw him place one of his big hands right on her shoulder and pull her into his kitchen. Not sure what he had in mind I moved closer and was in time to hear him order her to—

“Sit! Don’ give me reason ta make you the first lady I ever punched. Just sit and shut yer yap. Ya hear?” I’m guessing that she complied because his voice softened. “Now that I got yer

attention, let me tell you somethin'. You been ridin' roughshod over ever'one here in the outpost since I got here and I'm pretty sure you been doin' that since you got her a couple weeks ago. I heard a lot o' grumblin' about you."

Chow cleared his throat and I took advantage of the noise to float even closer. By looking at a piece of equipment across the hall I was at a perfect angle to catch his reflection in its shiny surface.

"I hear that you come from one o' them rich families up near Canada. You prob'by grew up all fancy and with servants goin' 'yes'm' and all that, too."

"No. As a matter of fact—"

"Thar you go agin', woman. All mean and nasty soundin'. Yer high falutin' ways ain't gonna git you nowhere around here 'cept maybe thrown out an airlock without a suit. Savvy. In fact, I know for a fact that you have been callin' friends back home tellin them how you are some sorta model fer yer lady friends. 'I'm the first of many' you been sayin'. 'I'm gonna have this place running ta my standards,' and stuff like that. Well, honey, I'm gonna tell you somethin' yer not gonna like. Yer about ta ruin it fer any other women folk ever gettin' a chance ta come up here."

"Uh... what do you mean?" she asked a bit uncertainly.

"I mean that even though the Swifts are about the most progressive company around and they've been hirin' women since way before it became the thing ta do, they also have a partic'lar way o' doin' business. It runs right smooth and nice and ever'body likes it just fine. An', yer provin' that one thorn in the flower patch kin ruin the whole crop. Kenny Horton is the absolute best commander this place could have. Nobody's ever had a complaint up here. He's had men beggin' ta not have to rotate back ta Earth fer their month of furlough they like it up here so much."

"So?"

"So... you've changed that. Men are now practically beggin' ta

go back home rather than have ta be cooped up here with you. All you do is complain and point out fault in others. I wonder just how good you'd feel if'n the show went on t'other foot. If ever'body pointed out the many, and I do mean *many*, things you've goofed up on, the couple o' things you managed ta break since gettin' here, all the times ya showed up late fer yer work 'cause o that note takin' o' yers, and things like that. But, they haven't. They've tried ta give you the benefit o' the doubt. How's about you doin' the same?"

I didn't hear what she said, her voice was so low.

In the reflective surface I saw Chow lean into her and place his mouth very near her left ear. I could not hear what he was saying so after three minutes I turned and went back into the hub, planting myself in one of our vacu-chairs—a nifty arrangement of a chair bolted to the floor and attached to the ships vacuum system, and one that Bud Barclay had dubbed SukSeats. About a hundred tiny holes draw in surrounding air once a person lowers themselves onto the seat. That vacuum then holds you gently to the chair so you cannot float away until you want to get up.

I tried to think what Chow might be telling her. I hoped that he wasn't outlining a plot whereby she might be tossed out of the nearest airlock, something I had overheard two crewmen talking about—joking about?—the day before.

All that I know is one minute later they came out of his kitchen, his arm around her shoulders, and they floated back into the hub area. Chow patted her on the head and she floated over toward spoke five. He winked at me and returned to his kitchen.

I have no idea what he said to her and I don't want to know. It's probably better that way.

Two days later I had the first of eleven of the men visit me to take back their requests to go dirtside. It seems that our little Nathalie had changed her tune and everyone was feeling pretty good about our first lady Wheelie.

CHAPTER 5/**For Our Next Trick...**

THE ONLY thing that we can't plan for is the un-planable. What we do plan for is whatever is supposed to happen in at least the upcoming sixty days.

And, nights.

Well, I say nights, but as mentioned earlier, we are never out of the sun. So we only know night by the clock. One of the very few things that Tom and Damon Swift didn't fully consider when they designed all of the systems in this station was that you either have to run on a twenty-four hour clock, to avoid time confusion, or you need to run a twelve-hour clock but have a way to tell *which* twelve you are in.

Or, what time zone to tie your twelve midnight to.

What they did was to start by deciding on a twelve-hour clock, the alternate being deemed to be more military. The outpost is anything but military—we only have three weapons on board and those are three e-guns, a handgun-style modern version of Damon's grandfather's invention, the electric rifle. They can provide a strong enough shock to knock someone out, but that's about it.

Anyway, they then tied out clocks to Shopton time, East coast U.S. time, that is. That worked just fine for about a week and then someone asked, "Which eight o'clock is it?" and that started the downhill slide.

By the end of month two we begged for, and received, replacement clocks for the whole station. We went 'military' and tied our midnight to GMT 12:00 p.m.

It took under three days for everyone to get use to it and that's how it has remained.

There are about fifty things on our plates in the coming months. Tom has even set up a specific time when we will have

the entire wheel evacuated and the air completely changed out.

When we first completed the wheel, three supply ships came up filled with only liquefied air under great pressure. That's a lot of weight, by the way. So much so that one of the rockets barely reached a high enough orbit to make it. It took all four of our little rocket tugs—sort of like little scooters but with reaction rockets front and back, top and bottom, and both sides that can be used to pull and push and spin heavy things like the spokes into position—to pull it up here from several miles away.

That air was released into the wheel in small doses until we were certain we had no leaks. Since that day we have been breathing that same air, albeit scrubbed of carbon dioxide, over and over and over. Tom and Doc worked it out and figured that at the fifteen-month point, all the air needs to be replaced to keep us at peak operating condition. At the same time, as most of us will sit inside of one of the five supply rockets that will gather for the event, a small team will siphon off the existing air into a large tank, replace our current scrubber system with a radically newer and more efficient one, and then seal the wheel so that we can pump in the new stuff.

It should only take us about twenty hours.

I've seen the specs for the new CO₂ scrubber. It removes the CO₂ from the air, and separates the carbon from the oxygen just like the existing one, only then it compacts the carbon and some impurities we've exhaled into pellets that we'll ship back down for recycling. As it stands right now, we collect the loose carbon and solids in bags that are ejected once every three weeks and fall back into the atmosphere. They burn up well before the get closer than about twenty miles up, but that does release some carbon into the upper atmosphere.

And, Tom is vehement about cutting our carbon footprint. This is a small step but one he feels strongly about.

From what he says, and Tom is generally right about these things, we won't have to do another air swap for more than three years with the new system.

We are also preparing for some upgrades to the solar battery factory. Tom, again, has devised a new method for—gee, I’m not sure how much of the technology I should tell you about. Hmmm?

I just radioed Tom to ask if I could include some basics in this book. He cleared me to tell you a few things.

So, as you probably know, the solar batteries are able to store such a tremendous amount of power because of the way they are arranged inside. Where a typical automobile battery weighing in at somewhere around thirty pounds has about two-hundred twenty square inches of flat, interactive plates suspended inside a nasty acid bath, Solar batteries have ten times the exposed surface area all coiled up and sitting in a proprietary solution that is only half as toxic.

This new method of construction will let us increase that surface area by greater than forty percent in the same size case, or to reduce battery size by about one-third. We will be doing both.

The topper is that these new batteries will hold and dispense a charge over a much greater period of time making our mid-size units superior to even our closest competitor’s highest capacity batteries.

Is it any wonder that we have eighty-two percent of this market?

I guess the biggest news is that we are going to be visited by some special guests next month.

Turns out that Damon was sitting in a congressional meeting a couple months ago when, during a break, he overheard two senators bemoaning the fact that a desired visit to the International Space Station—evidently with an eye toward extending funding to keep it up here for another six years—wasn’t going to be happening. The logistics of getting people up there became much more difficult when the Space Shuttle program came to an end and the remaining shuttles were decommissioned and hung up in three air and space museums.

“If you don’t mind my overhearing you, sirs,” he told them, “Swift Enterprises could ferry your group up to the ISS in our ship, the *Challenger*.”

They thought it was a great idea until a consultant to ISS folks reminded them that their systems could support only a brief visit by one or two people at most now that they were at full crew compliment, and the committee wanted to send up a dozen.

That led to Damon suggesting that the *Challenger* still be used but that the team members could stay at our outpost and be taken down in pairs for brief visits to the ISS over a weeklong period.

They took the idea to their committee and everyone loved it.

As a result, we are getting not only the Senate Select Committee on Space, all seven members, plus a group of four Congressmen who are the House’s counterparts to the Senate group, and...

And... the Vice President of The United States!

The President could not be cleared to come up for national security reasons, but his VP is coming. He isn’t interested in the ISS, he simply wants to come up to see our wheel.

We won’t have to make much in the way of preparations other than to set up some of the men in a “hot rack” bunk-sharing scheme so that their bunks can be taken by our visitors. Of course, the Vice President will be taking my room.

Our lady Wheelie, Nathalie, is due to rotate to Earth the week before so I will take her little space.

Chow will be coming up a day early and will be the chef for everyone, and the small support team for the visitors will remain in the *Challenger*. It’s just a small team of three, but we can’t accommodate them inside. We’ll probably have to set up a line between the *Challenger* and the outpost. I can’t take the chance of any of them drifting off into space.

Like I said, there won’t be much to prepare for. We already

keep this place spotless. You have to. You just can't have loose things or dirt floating around getting into vital systems. There will be a little straightening, and I can think of at least ten places that could use a little touch-up, but they will take us as we are.

A couple of the men started getting a little excited and worried about how to react to the guests. I reminded them that only one of the Senators had ever been in space—he had been up in one of the shuttles—so most of them would be having too many issues with zero-G conditions to be much bother.

“We'll outfit them with BBs (Barf Bags) so they won't foul up things. They won't have had any exposure to weightlessness. I'm pretty sure they will be merely curious about what goes on up here. Don't worry about them. Just do your jobs and answer any questions they might have unless it involves confidential matters; refer them to me. Remember. We don't report to these folks. This wheel is owned and operated by Swift Enterprises. They are just here to be amazed by what we do!” is what I told the crew in an address yesterday.

Beyond that, who knows? We sit up here doing work that really can't be performed down on Earth. We have a better view from our small portholes than anyone on Earth has from even their largest picture window.

I hear that the only thing to compare it to is the view from atop Mt. Everest. Even there, all you can really see is snow and your own frozen breath.

At night, we are close enough to see the small light clusters from Earth's largest cities. Because of our position to the planet and our height, the closest we come to sundown is when we and the planet rotate completely away from the Sun. At that time we are only about nine degrees above the horizon, but that still means we are completely in sunlight except for fifteen days during the two equinoxes.

Then, we get to enjoy an entire thirty-nine minutes of "night."

On the cover of this book, I've included a picture that Bud Barclay took of Tom when they came up for a visit a month ago. The two of them donned maneuvering backpacks and headed about a half kilometer away.

It is one of my favorite photos.

Tom floating above the Earth with our wheel in the background.

It looks like magic. Believe me. Living up here *is* magic.