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Tom Swift's — SuperSight

By T. Edward Fox

Mysterious things are happening near the Swift's nuclear facility, The Citadel. Strange lights in the desert at night, swirling dust storms on the calmest of days, and rumbling noises more felt than heard. The only problem is that when anyone drives or flies out to the area, everything looks and sounds absolutely normal, like the rest of the New Mexico desert.

Tom Swift suggests that a satellite sweep be made of the area but runs into his father's non-rescindable orders that the area around the facility are strictly out of bounds. No exceptions.

With practically no time of his own, Damon turns to his son, Tom, to investigate. Of course, Tom runs into the same problem: no matter what he thinks to try to find out what is going on, the moment anyone arrives or activates remote devices, everything is normal.

The only thing to do is to find a way to take a close look at the area without the chance of being detected.

I dedicate this story to a device rather than a person or group. To CORONA, the first of the "spy" satellites launched during times of great intrigue and capable of returning astoundingly detailed photographs in an age when most cameras had problems getting any detail further out than a few dozen yards.

Look up the history if this incredible technology. It is fascinating!

A SWIFT ENTERPRISES INVENTION STORY

SuperSight

Victor Appleton II

FOREWORD

There was a lot to see in placed around the globe that really didn't want cameras snooping around back in the 1960's. I well remember the old GAMBIT, CORONA, LANYARD and ARGON top secret programs of launching a photo satellite, filled with high-resolution equipment and film...that's right. Film! Not your average Kodak moment film either. Giant spools of film like todays IMAX film.

Film that had to be sealed into what were referred to as "buckets" and dropped out of the satellite only to re-enter the atmosphere, pop out a small parachute, and then to be snagged by aircraft outfitted with a giant "fork" up front to catch them. What came back was the stuff of science fiction. From low Earth orbit we could see things as small as a couple feet across.

These things included nuclear missiles in Cuba. Heady stuff.

Probably the most famous Hollywood use of this program was the movie *Ice Station Zebra*. I won't review or detail it here, but is is an interesting look into the Cold War politics and the high level of interest placed on these returning canisters of film.

I admit to some surprise at the success of this program, in a pre-digital age. I also must say that it was shocking to find out that Damon Swift had been so successful in denying any over-flight access to The Citadel that even he could not rescind it. Lucky for all of us that Tom is one smart young man and found a way to overcome this situation.

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PART 1**Lights, Swirls and Beating Hearts**

TOM SWIFT, young inventor, walked into the spacious office he often shared with his famous inventor father, Damon Swift of Swift Enterprises, just as the older man was finishing a telephone call.

“...then get back to me as soon as you’ve been able to get out there when it’s happening. We absolutely must know what’s going on.” With that, he said “Goodbye,” and the call was terminated.

“What’s going on, Dad?” Tom asked.

Giving his son a rueful grin, he replied, “I only wish we knew, Son. It’s The Citadel. They’ve been experiencing the strangest things lately. Stationary but dimming and brightening lights a half hour or so before sundown, swirling dust in the middle of relatively calm days, and even the sounds of—well, this is the oddest one of all—the sounds of beating hearts.”

Tom’s eyes went wide. “Beating hearts?” he asked incredulously.

“Something that the sensors are picking up that sound like that.”

The Citadel was the Swift’s privately owned and operated nuclear experimentation, development and power facility in the deserts of New Mexico. Now entering its third year of operation, it was remote enough to

dissuade most casual sightseers, and ringed by an ultra-sensitive array of visual, heat-sensitive and acoustic sensors capable of picking up anything as small as a desert rat and able to discern between most living creatures. That included man.

Mr. Swift continued telling Tom about the recent strange happenings. “About three weeks ago the sensors picked up a very large, but low heat signal in the early morning hours. It was almost stationary or at least within a few dozen yards, but it was large. As in the size of a basketball court. It is just over a small rise in the ground so we have no direct view of the ground, just a few feet above it. We sent a Security truck out to see what it might be, but they found nothing.”

Tom raised an eyebrow. He found it difficult to believe that anything large enough and warm enough to register could just vanish. He told his father as much.

“Well, vanish it did. However, later that afternoon one of the guards was scanning the horizon with his binoculars when he claims to have seen a little series of puffs of dirt and a few swirling mini-vortexes. Before you ask, just about where the heat signature had been.”

“They get dirt devils out there all the time, Dad. It must have been one or more of those.”

Shaking his head slowly, the older scientist said, “Almost no wind that day. Nothing showed on the sensors out near there. Then,” he added quickly seeing that Tom was about to say or ask something, “a half hour or so before sundown, a series of small lights began blinking on and off. Pretty soon they all melded into one large sheet of

lights, stayed around for a half hour or so and then quickly blinked out of existence.”

“What did the Security folks do?”

“Sent out another truck in the afternoon—nothing to see—and a helicopter the following evening. The closer it got the fewer lights were there until they all disappeared.”

The two men sat looking at each other, both trying to find some explanation. Finally, Damon spoke.

“It has happened most days since then, but the lights have been growing in intensity. At least, they appear brighter to the naked eye. The problem is that whenever anyone goes out there, even on foot, there’s nothing to be seen when they arrive at the site.”

Tom’s brow furrowed as he thought about everything his father had told him. “How high up has the helicopter been?”

Damon looked at some scribbled notes and finally found what he was looking for. “The lowest passes have been a hundred feet up and the highest ones have been in excess of three thousand feet. Are you thinking that we’re tipping out hand with the noise?”

Tom nodded. “I do. Let me give Dick Bertis out there a call. I’ve got a few ideas that might help them sneak up on whatever or whoever this is.”

An hour later he was in the small office he kept in the *Sky Queen’s* underground hangar and speaking with the Security Chief at The Citadel. After getting pretty much the same information his father had received, Tom

suggested, “Instead of reacting to something occurring, why not send the helo out a half hour or even more before each even usually begins?”

“Sorry to tell you, Tom, we’ve already done just that. We’re stumped right now, but I was going to give you a call to ask for permission to add a reconnaissance camera to one of the extra drones we have out here. Jeff in the tech shed thinks he can pull out the disabling circuits and install a camera and transmitter in a day or so.”

“Go for it, Dick. Tell him to put a good telephoto lens on it and to fly it above five thousand to minimize noise as far as possible, have it transmit the exact GPS location; do it for four days in a row. We want to make certain that this isn’t getting any closer to the actual facility. Right?”

“It seems to be keeping its distance. We’ve used the laser distance finder in Tower Two and we know the dust is about ninety-five hundred yards out. If we point it out there in the evening, the lights just go out and don’t come back for a day or two. If it has moved, it’s only within a few yards to one side of the other.”

Tom thanked the man and hung up. He had a thought and called his father’s number. Their secretary, Munford Trent, answered. “Sorry, Tom. He’s on a call with the Minister for Foreign Trade in France right now. Would you like me to have him call you once he’s off the line?”

Tom asked him to do just that and then turned to a small project of his own. He had been trying to find a way to supercharge his own L’il Idiot line of microcomputers. Their processors were already running at their very fastest speed, but it wasn’t enough for some applications

Tom could foresee.

He was rigging up a closed-loop Freon and glycol cooling system to try to add an almost frozen jacket around the chips when the door of the office opened and his best friend, Bud Barclay, stuck his smiling face inside.

“Working on anything vital to the safety or survival of mankind, skipper?” he asked, cheerfully.

“Well—”

“Really doesn’t matter,” the dark-haired flier and athlete told him. “You and I have been cordially invited to participate in an endurance test. Interested yet?” He looked expectantly at Tom. Then, failing to see anything close to enthusiasm register on the inventor’s face, Bud added, “Did I mention that there would be girls involved?”

“Bud? The day you can clear it with my sister to go out to anything that involved girls other than her and possibly Bashalli, that’s the day I’ll buy you a brand new sports car!”

Looking thoughtful, Bud sobered as he said, “Well, actually the girls in question *are* your sister and your girlfriend. And, the event is a dance marathon at the elegant Northern Lights Room in the stylish Tishamingo Towers over in Oswego.”

When Tom and Bud first met almost three years earlier, the boys had both been sixteen and Tom’s sister, Sandy, was fifteen. She had immediately decided that the handsome teen was going to be her boyfriend and set

about planning for the days she turned sixteen and would be able to date. They had been together since that day.

Tom had been dating Bashalli Prandit, born in Pakistan but raised since the age of ten in the U.S., for almost fifteen months.

Both of the boys knew that they were so busy with their respective work at Enterprises that finding the time to date the girls was often difficult. Even though they feared that attention might be paid to other potential suitors—and the girls frequently said that other possibilities *were* available to them—the truth was that both couples were devoted to one another, and so allowance were made.

“Might be a fun diversion at that,” Tom told his friend. “When? How horribly dressed up do I have to get? And, is this already arranged and I’m just being given a courtesy notification?”

Bud came stumbling into the room followed by Tom’s sister and girlfriend.

“Tonight. Comfortable casual. And, you’re just lucky that Bashi and I didn’t arrange to have you kidnapped and dumped at our feet at seven!”

“Sandra might be wording things a bit stronger than I would, Thomas,” the beautiful dark-haired and dark-eyed girl told him, “but the truth is that if you had any greater notice you might come up with a reason why you can not attend.” She smiled at Tom and batted her long eyelashes at him.

Tom held both hands up over his head. “Caught. I give

up,” he told them. “I do have to take care of something before I go home and change, though.”

He told them about the strange phenomena in New Mexico. At first, and knowing how top secret most of the work was, the girls were worried, but the more they heard, the more curious they became.

“When you go out there... and we all know that you will, Tomonomo... you have to promise to save enough room for Bashi and me.”

“Deal!” he told them.

The ‘marathon’ turned out to be a seven-hour dance session with all couples dancing each and every tune. Local businesses had agreed to donate money to charity for each couple who made it to the end of the evening. Every hour there was a five-minute bathroom break, and by the end of the evening they were all exhausted.

“How in the world did those people back in the nineteen thirties keep that up two or three or four days in a row?” Bashalli asked as they sat at a table talking as the rest of the crowd began departing.

“I don’t know about that,” Bud said, “but I do know that there is something you three should see up on the rooftop observation deck.”

Giving her date a dark look, Sandy stated, “Just as long as it involves no stairs or walking greater distances than a few yards at a time! Carry me?” She held out her arms.

Bud took one hand, kissed the back of it and pulled her up to her feet. “We walk!” he told them.

He led them to a bank of elevators just outside the doors of the club. They went to the thirty-ninth floor and got out. An observation deck ran around the entire perimeter of the building and was almost completely empty. Two other tired-looking couples had come up to use the array of telescopes arranged every ten feet or so but they soon left.

The four took turns using various telescopes looking all around them. To the southwest they could see the downtown building of Rochester. To the southeast they could make out some parts of Albany and to the north they could see the lights of Ottawa, Canada.

“It is just too bad that you can’t see any details out there,” Sandy told them. “It might be nice to see if someone up in Canada is looking down here right now trying to see it we’re looking up there at them.”

While they enjoyed the sights, they were so tired that they practically forgot what they had seen once they left the building and headed for Shopton in the small jet they had flown over in. They all arrived at their homes at about five a.m.

It was Saturday so Tom and Sandy slept in until almost noon. As the Swifts all sat around the breakfast table enjoying the French toast strata Anne Swift—Tom and Sandy’s mother—had intended for breakfast, Tom and Damon were discussing the situation at The Citadel.

“Last night it hit me, Dad. We either need to buy or borrow a really powerful telescope and continually sweep that area, or perhaps even have one of the high-resolution photo satellites make a pass overhead and see if they can spot anything.”

Mr. Swift set his fork down and wiped his mouth. “The first one may be possible but the second is not.”

“Why not, dear?” his wife asked.

“Because I did something necessary, but far too well, I’m afraid. You see, knowing that at least five countries had satellites capable of taking detailed pictures from space, and we were not all friends at that time, I set in place an absolute edict that no satellite would be allowed to pass within twelve degrees of latitude north and south, and inside an area stretching from fifty miles west to fifty miles east of the facility and take any photographs. Period. No exceptions. We have Congressional and NATO permission to go up and confiscate any satellite that breaks that boundary.”

“But, if you put that in place, surely you can ask for an exception. Can’t you?”

“No, Anne. Well, actually I can, but things are so set right now that it would take more than eleven months to change the orbit of any one satellite so that it passed right over the area, and we would need that straight down view to see anything.”

“Even then,” Tom added as explanation, “it would need to pass overhead at about high noon of there would be too many shadows.”

“Tom’s right. The odds of that happening in even the next three years are so close to zero as to be *no chance at all!*”

PART 2

Plan B

“WHAT WE need is another approach,” Tom told Bud as they sat in the Enterprises’ canteen sipping coffee and discussing the problems a few days later.

“Well,” Bud said slowly, looking over the top of his cup, “while I am all for dropping our attempts at ground-based surveillance, what does that leave us with? I mean, the folks at The Citadel already have tried flying out in helicopters, driving out and even hiking to the area. Even the quietest attempts have failed to find anything by the time they get there. So, what’s our next plan of action?”

Tom thought for a moment before replying. “It would have been so much easier if dad had been just a bit less adamant about the whole satellite overflight stuff back three years ago. Now, there is no U.S. recon satellite or even one from any friendly nation that can be nudged into a position to provide photos for at least another sixteen to eighteen months!” He told Bud about the slim odds of a properly timed flyover.

Now, it was Bud’s turn to think for a moment. Finally he said, “Is the outpost able to get a good look?”

“No,” Tom said, glumly, realizing that this friend referred to the large space station the Swifts had placed into orbit months earlier. “They may be up in geostationary orbit, but the fact that they are parked over the equator puts them at too acute an angle to see

anything. Even the Megascopé can't get a good look because of the angle involved."

Bud brightened. "So, you create something that just floats up over the area with a big video camera onboard. Right? Like, maybe you can make a balloon that has the camera slung underneath and a transmitter."

"Well, the idea might be interesting to try out," Tom said carefully, "but in order to carry up, say, ten pounds of digital camera and a simple transmitter..." he pulled out a calculator from his shirt pocket and began pressing keys in rapid succession, "...you would need a balloon of—" he stopped seeing that Bud's eyes were telling him that too much information was about to come through.

Tom cleared his throat and took another tack. "Okay. A standard party balloon holds about a cubic foot of helium. It can lift just about one-fifth of an ounce. So, to lift ten pounds we need a balloon that holds about nine hundred cubic feet of helium. That's a balloon larger than thirty-two feet across. Even using ultra thin mylar, the balloon's material weight requires it to be another foot wider."

"So, you can build a balloon that large. No big deal, pardon the pun."

Tom grinned. "Well, from a visibility standpoint, and even if we could make it out of Mylar or something that was the same blue color as the sky, it would be technically possible to see it at any altitude under about forty-thousand feet. Binoculars, telescope, or even by careful visual observation."

Bud's brow furrowed. "Okay. But, again I'm thinking

that getting a helium balloon up that high is not an issue. So, what's the problem?"

"The problem is that at that altitude, even with the lightest weight telephoto lens, the best resolution we could hope for would be to recognize something about thirty feet across. That's not going to be much of a help when searching for something that seems to be able to disappear in seconds."

"Ah!" Bud held up a triumphant finger and smiled. "You do the same processing they do on TV when the bad guy's car zips past a closed circuit camera and the expert in the crime lab zooms right in and cleans up the picture electronically!" He sat back, satisfied that he had solved the problem.

Shaking his head, Tom explained, "That's television sci-fi, Bud. You know the old expression, 'garbage in - garbage out?' Well, the same goes for digital images. If you don't have the data in the first place, you can't zoom in and suddenly have good focus on something. Sorry. Besides. Watch those shows more carefully. The license plate is typically at a pretty acute angle in the first shot until they 'process' it when it magically rotates to a better angle so you can read the letters and numbers."

Bud deflated somewhat at the news. They sat in silence for a couple minutes, both lost in their own trains of thought. Finally, Bud spoke.

"Okay. I'll just say this one thing then I'll slink off and keep quiet. In the close to three years we've known each other, you have pulled off more science fiction-like miracles than anyone I know or have ever heard of.

Millions of kids have dreamed of building a rocket in their back yards and taking off to explore the moon. They dream; you did it! I read Jules Verne's *Journey to The Center Of The Earth* once and thought I might find a cave that would take me down to where I would find a lost civilization and untold riches."

Tom interrupted him. "I never did *that!*"

"Oh, yeah? I've got two things to say about that. Atomic earth blaster and those nuclear fire caves in Africa!"

Tom nodded. "All right. Suppose that I can come up with something that has amazing resolution. The U.S. did it back in the sixties with their Project Corona. From Earth orbit they were able to get pictures that could help them identify things as small as a couple yards across. They were using such high-resolution film that they did have the necessary information to blow up into something usable. Digital is a bit trickier. It can do amazing things but even cameras with twenty million pixels don't have as much physical picture data as the old seventy-millimeter and five-inch film they used. In fact..." he began doing more calculations. "In fact, and I'm taking guesses as actual weights, but I believe that it would require a balloon of over one hundred feet to carry up equipment that might get us four-yard resolution." He shrugged.

Bud took the last sip of his coffee and got up. "Okay. I admit defeat. I'll leave you with just two final words. *Sky Queen.*" With that, he turned and left.

Tom sat in silent contemplation for another hour as the canteen workers cleaned up around him from breakfast time and readied the room for lunch. When he finally left

he had formulated a new plan.

The only time the two friends got together during the next three weeks was on a double date; Bud was the constant date of Tom's sister, Sandy, and Tom had been seeing Bashalli exclusively since the day they met, and they frequently double-dated. The foursome headed to a hamburger restaurant they had discovered a few months earlier. The owner—who along with their destination, *Flock of Burgers*, also owned *Herd of Chickens* in a neighboring community—had been so happy that the famous Tom Swift was eating in his establishment that he had asked to be allowed to name one of the burgers after the young man. It had become one of his best sellers.

He greeted the four young people like they were old family friends giving Tom and Bud warm handshakes and gentle hugs for the girls.

Although they came by at least once a month Tom was slightly embarrassed by the solicitous attentions of the owner. Sandy and Bashalli beamed at being treated almost like visiting royalty.

Following dinner, they went for a walk through downtown Shopton stopping for a few minutes in the blocks-long park that had been secretly donated by Tom's grandfather and grandmother as the same time Shopton was growing from about two thousand people and into the small city it had become, now sporting a population of over twenty-nine thousand.

Bud inquired about Tom's progress in the situation out in New Mexico. The girls who had been filled in with some of the details over the weeks were eager to know

more.

“Well,” he began, “you both probably owe Bud here a kiss on the cheek. He kept prodding me a few weeks back and finally dumped a partial answer right in my lap.”

“What could Bud have said to give you the inspiration?” Bashalli asked.

“Yeah. He’s big, he’s handsome and he’s a great kisser, but what the heck could Budworth Barclay have said to solve the problems?” Sandy said giving her date a playful poke in the ribs.

“Yeah, skipper. What the heck could I have— wait!” He turned to Sandy. “You think I’m a great kisser?” He smiled broadly.

“Don’t get a swelled head, Bud. I’ve got almost nothing to compare you against!”

“Anyway...” Tom said trying to bring the conversation back around to the subject at hand, “he told me that I should be thinking of a solution that uses the *Sky Queen*. After all, she is large enough to carry practically anything I come up with and can fly high enough to be invisible to all but the most powerful binoculars.”

“But not RADAR,” Bud stated. “Tomasite keeps that from happening.”

“Yes, there is that but I’m fairly certain that our phenomena isn’t outfitted with anything remotely similar to that. Otherwise, we’d have picked up the electronic signature. In fact, dad and I are stumped over the fact that there are the lights out there but nothing registers on any of our sensors.”

“So, what will be the next step in your attempts to find out what this is?” Bashalli asked.

“I’m going to have to come up with a way to take very detailed photographs from a very great height.” He told them about the formerly secret satellite programs and how they had been able to see how many people were sitting around an outdoor patio table.

“Those were black and white cameras with amazing film that is no longer produced. But, I need something more immediate and in full color. Out in the desert it is sometimes almost impossible to tell the difference between a rock and a bush because they are so close in color. Contrast will be everything.”

He changed the subject but resolved to discuss the matter with his father as soon as possible.

By the time Tom had taken Bashalli home and dropped Bud off at Enterprises where the flier had left his car, it was nearing midnight. Tom and Sandy headed home.

The following day Tom received a call from Dick Bertis at The Citadel.

“We’ve got some overflight pictures of the area, Tom. The drone outfitted with the camera was able to get some really good shots from directly over the area. That’s the good news...”

“Let me guess,” Tom told the man. “The bad news is that they show nothing. Right?”

“Afraid so, skipper. Bare ground in the mornings, everything obscured by dust in the afternoons, and just a

little unidentifiable bright area in the evenings. When I directed the drone into a lower flight path, the light disappeared. Five thousand feet is as low as we can go and still get anything that late in the day.”

Tom thanked the man for trying. “Keep the drone outfitted with the camera,” Tom suggested. “It might come in handy some day.”

It took three days before Tom was able to get time with Damon Swift to discuss his ideas.

“Dad? I’ve got some questions that I need your insight on.”

Mr. Swift let out a little chuckle. “It isn’t often that you need my advice these days, Son. In fact, it seems that I rely on you more and more. What’s on your mind?”

“It’s this thing out at The Citadel. I’ve accepted the whole satellite-won’t-happen thing, but feel that only something high up will be able to catch whatever it is out there off guard. Any time we try to get out closer, whatever it is, is just gone. If I didn’t know better I’d say we’re all suffering from a mass mirage!”

Damon nodded. “It certainly seems like that, but we both know there has to be a reasonable and provable explanation for it. So, what can we do?”

Tom told him about Bud’s original idea for a helium balloon, and Mr. Swift immediately saw the problems with that. “That leaves me with either something that can be flown very high up and over the area so we can wait in place for things to occur, or we erect a series of very tall

towers a mile or two away with mounted high-res cameras all trained on the area and just hope that the construction noises don’t drive it all away before we identify things.”

“Not much of a choice, is it? I was about to suggest that a small rocket launched from many miles away could put a payload high over the area that would slowly drift down on a large parachute, but realized that it is a one-shot thing. We need something that can go up time after time until you get a good look.”

“That’s why I’m going for something the *Sky Queen* or even a smaller aircraft, one that can hover for long periods of time and are exceptionally stable. That just leaves one big obstacle. The camera.”

They sat in silence for a minute.

“If I recall correctly,” his father said, “the highest resolution declassified military camera that we could get our hands on has a resolution of thirty feet at sixty thousand feet, but it is prone to interference from hot air, smog, dust and inclement weather. Oh, and it takes a digital scan of an area over a period of a minute or so before it outputs an image. Can you do anything with that?”

Tom pondered, then said, “Not really. I’m looking for something that has none of those weaknesses and hopefully outputs video. Real-time video. I’d love to match up a very powerful telephoto lens with some sort of computer enhancement system, but everything I’ve tried or read about points at a gap of a couple years before we have processors fast enough to work with the incredible

amount of data we'd need."

"By the time you might come up with something, this whole episode may be over. And, that means it either just disappears, or something bad happens. I'd really prefer that we pin this down before we find out which."

Tom agreed.

"How about ganging multiple computers together, each one with its own camera and then use a final computer to patch everything together into a single large image?"

"I ran a simulation the other day, Dad." Tom slowly shook his head. "The best I think I can do is to connect six CPUs into one and then process only about one frame per second. Plus, it looks like we could only cover an area of about one-hundred-fifty by eighty feet from sixty-five thousand feet, and that's the minimum altitude I figure will be totally silent on the ground and invisible to human sight."

He returned to his underground lab and was deep in research when Bud dropped by. "Heading to lunch in Thessaly, skipper. New barbecue place. Want to join us?"

"Huh?" Tom looked up and tried to focus on what Bud had said. "Um... lunch? No. Thanks, but I'm really swamped with this New Mexico thing." He briefly told Bud about the problems with the video and the processing.

"Can I ask a typical Barclay question, Tom? One that you've probably already thought of but I need to get it out of my system?"

"Well, sure. What?"

"Okay," Bud started, pulling over a stool and sitting down to face Tom. "First. Is it possible, in your mind, to do that TV magic you see on police dramas where they use a computer to get really close looks at things? Even if it's just a small area and far away?"

"To some degree, it is. Given all the right conditions. It's still a 'garbage in, garbage out' situation, though."

"Alright. And you say that you can handle six cameras in your setup."

"Uh-huh. The problems come in with trying to put everything together. Six is about the top number the last computer can handle."

"Right. And, that's because your computers can't think any faster?"

Tom gave a rueful chuckle. "Well, they can't process all the data any faster, but basically, yes."

Bud nodded emphatically. "Okay, so make the processors go faster. You were working on that Mr. Super Freeze thing that you told me would probably let processors run so cold that they might triple or quadruple their speed..." He looked expectantly at Tom.

Tom eyes flashed and a smile came to his face.

"Bud! You're the genius here. If I could achieve a 4X speed increase in each of the processors, then I could process things so fast that twenty or even twenty-five frames per second should be a snap."

Bud was beaming. he loved it when he could contribute to any success for Tom or for Enterprises.

“And,” Tom continued hitting a series of keys on his keyboard, “the more data we can process the more we can input up front. The more up front, the better the final pictures.”

“So, instead of garbage in and garbage out, you can do good stuff in and good stuff out?”

“Better than that. I think I can figure a way to do good stuff in and great stuff out!”

PART 3

I Am The Eye In The Sky

TOM WATCHED as the figures came up on his screen. He had been running simulation after simulation for more than three days straight. Each time he changed the parameters, he grew more and more enthusiastic.

“Do you think you can come up with something in the next week of so?” his father asked that evening. “The reason I ask is that the Government is now quite worried about a possible intrusion into our protected space and wants to run what they call a ‘surgical incursion’ all around The Citadel.”

“What’s that mean?” his wife asked.

“It means that they want to race around in tanks and shoot shells into any area that looks even slightly suspicious. I’ve told them that such actions would be most disruptive to our work, but they have reminded me that the Government owns the land surrounding our facility. I can only hold them off a week, perhaps ten days at the most.” He looked hopefully at Tom.

“I’ve finished running a series of tests. I need three days to get the cooling system finished, and I’m still looking for the best way to super cool the glycol in the system, but after that I think I can get the programming finished while Arv Hanson and Art Wiltessa get their people working on the computer and the camera tie-in systems.”

“Why not use Derek James and his team in the computer lab for that?” Mr. Swift asked.

Tom looked askance at his father. “You’ve got his entire team tied up in your space probe program, Dad. I know how vitally important that is and you’ve made really big guarantees, so I never considered them.”

Realizing that Tom was absolutely correct, Damon looked at the ceiling and said a silent prayer of thanks for his son’s intelligence.

“I ordered six of the most powerful lenses available. Those will feed six of the highest resolution CCD circuits I could find. Each one is broadcast quality HD capable with sixteen megapixels. On full zoom they will give me enough data to have twenty-eight foot resolution from altitude, and the computers will be able to interpret that information down to five foot res.”

Mrs. Swift looked from her husband to her son and then to her daughter. Sandy shrugged at her. She turned to Tom and said, “Mother is a bit hard of comprehending. Can you say that in small and slow words that might ring some bells in my little, woman’s mind?”

Tom laughed out loud. He knew that his mother had an advanced degree in Molecular Biology and, even though she chose to be a housewife, had a keen mind and high IQ.

“Okay, Momsie. Basically, I am building a camera with six lenses that all feed into a computer and all that visual data can then be used to provide an even greater degree of zoom. You know the little video camera you use on vacation?” She nodded. “It has something like a four-power zoom that is completely optical—using the actual lenses—and then another ten-power zoom that is electronic.”

“But, dear. I never use that extra zoom because things get very blurry and shaky.”

“Right, but newer cameras have special anti-shake circuitry that helps overcome that. I’m going a step or two further by adding a gyro-stabilization system and image-steadying software. It all ends up meaning that if a camera can normally let me identify something so long as it is at around thirty feet wide, then the computers will enhance that image and give me a good view of things as small as five feet across. I’m just hoping that will be enough to get a look at our mysterious phantom.”

“What would you need to do to focus down to something a foot or so across, or even to be able to read license plates like Bud thinks you should?” Sandy asked, setting her fork down.

“More data, basically,” he told her. “The more we can gather and process, the better the final image on the screen.”

“So, a bigger lens? More zoom power?”

“Well, partly, but the biggest obstacle between a camera up there and something down here is the very air we breathe. It’s incredibly dense and full of water and dust and other stuff. I’d have to be able to look down through anything in the way and ignore it.”

“So?” Sandy asked the question as if she knew that Tom could come up with the answer. It came out more as a statement than a question.

Tom thought a moment. “Hmmm? To do that I’d have to be able to use light in alternate spectrum, like infrared and such. Probably even four or five different spectra of

light. Plus, it would help to have additional terrain information. Some type of RADAR or laser scan, but we know that laser light makes our specter disappear. Of course I'd have to rewrite the software."

Sandy nodded and picked up her fork, spearing a final bite of sweet and sour cabbage on her plate. "How long to do all that?"

Tom started at her. She was concentrating on her mouthful and not looking up, so he turned to his mother. She was slowly nodding and gave him a quick smile, then picked up her empty place and got up.

Damon Swift was no help. He simply stared back at Tom almost daring the boy to disagree with his sister.

Tom put his head in his hands and closed his eyes. He thought it over. Finally, an answer hit him.

"I can't do it because I can't get all that visual data through the lenses. They work on the visual spectrum only." He sat back satisfied that he had answered the question.

Without looking up, Sandy merely said, "Then you make a lens that can accept and pass through all those other spectra. Make it like a compound lens of a bee's eye. They supposedly have different receptors all in the same large lens arrangement." She, like their mother, picked up her plate and headed for the kitchen.

Tom looked at his father. "I hate to say it, Tom, but Sandy's right. It might not be something you can do today or even before we need to get some sort of report to the Government, but why *not* a compound lens? By using a series of prisms and mirrors you can split off what you

need into separate receptor panels. You might even experiment with dozens of small lens areas in one large master lens."

"Like the experiments a few years back I read about. Something about being able to take pictures that could be refocused and reprocessed electronically even years after they were taken because the lens used actually had a hundred mini lenses, each with its own focal distance. Never went anywhere because the lenses couldn't be made for less than ten thousand dollars or something. Looks like I've got some rethinking to do!"

Two days later he had his answers. And, a design was taking shape in his computer. A single lens system, more than three feet across, would hold about two hundred individually-ground lens positions. Each one would be optically divided and its various data sent to fifteen receptor CCDs, then the visual data from each would be optically zoomed before being enhanced by a master computer running at close to minus two-hundred fifty degrees.

He concluded that anything less than circulating liquid nitrogen couldn't provide the intense cold necessary to make the fastest bank of microprocessors available run quickly enough to process the data. He had the engineering department construct the necessary high-pressure, low temperature system.

When finished, the master computer would be mounted up in a small office space behind the main cockpit of the *Sky Queen* and the lens and initial processing units mounted in the belly of the giant jet.

However, for this first run, Tom's original design with

it's six separate lenses would be used. He was certain it would benefit from the super-cooling system.

It was day nine on the Government's schedule as the giant Flying Lab soared skyward and headed for New Mexico. Onboard were Tom, Bud, Hank Sterling—Enterprises' Chief Pattern Maker and one of Tom's go-to employees—Art Wiltessa and two of the Security team, Phil Radnor and Gary Bradley. At the insistence of the Department of The Interior, under whose auspices The Citadel operated, an observer had boarded just a minute before take-off.

Millicent Brossard was a severe-looking woman in her thirties with fairly short dark hair swept back and held in place with some very powerful styling products, and wearing a dark wool business suit totally inappropriate for the hot desert toward which they were traveling. She sat in stony silence in the lounge with most of the Enterprises men.

At the last minute Sandy and Bashalli had begged off as both had come down with summer colds. They were disappointed, but Tom promised them they were going to miss nothing. "It will be a fast and pretty boring trip," he told Bashalli, promising to call her whenever he had spare time.

Gary Bradley came up to the cockpit an hour into the flight. "Sorry for the intrusion, skipper," he said to Tom, "but I had to get out of there. That woman is really bringing down the room. Hasn't said a single word but she just oozes disapproval at everything anyone else says. I just need a few minutes to collect my thoughts."

Bud turned and grinned at him. "But, Gary. You're

supposed to be Security's Mr. Smooth. Can't you melt her cold exterior with one of your winning smiles?"

"Tried it. No such luck. I'm no pilot but I'd be happy to sit in your seat and let *you* go back there, Bud," he said in reply. "I've never seen anyone who can hold a scowl as long as she has."

Five minutes later he left the cockpit.

They arrived at The Citadel a little after eleven-thirty a.m. local time. While Tom, Art and Hank mounted the external lens system, made the necessary connections and then lifted off to an altitude of five thousand feet to test the system, the others headed for the Administration building and the small canteen.

By the time Tom and the others returned, everyone except for Ms. Brossard had disappeared. She was sitting at a table, alone, reading something on her notebook computer. Her face still wore a scowl and her body language spoke of deep anger.

Giving Bud and Hank a shrug, Tom approached her. "We ran into a small problem with the stabilization system so we won't be going up until early tomorrow morning, Ms. Brossard. The accommodations on the *Sky Queen* are pretty sparse so I'll arrange for you to stay the night in one of the guest apartments just the other side of this building." He smiled at her.

She looked into his eyes and then narrowed hers. "What makes you think I have time to just sit around here?" she demanded. "If you weren't going to be ready you should have let the Department know and I would not have come to your company until tomorrow!"

Tom pursed his lips, counted silently to ten and then told her, “And you would have been sitting back in Shopton until we returned. We had no idea that there would be a problem. Everything worked back at Enterprises when we did our system checks yesterday. The issue was an unforeseeable failure in a small circuit board. I will be spending several hours building another one this afternoon and testing it before dark.”

He turned to go, but then felt that some additional interaction was needed. “I can ask Bud Barclay to take you into the small town about twenty minutes away if you would like to shop or have a late lunch or early dinner there away from us. We seem to be a great source of dissatisfaction for you. If you do not find our rooms to your liking, you might find one there. As we will be taking off at six tomorrow morning we can have a truck pick you up wherever you decide to stay at four-thirty.” He turned and began walking away.

“I really do not appreciate being treated like this,” she hissed at him.

Tom swung around to face her. “And, I do not appreciate having you show up with a chip on your shoulder so large you barely fit inside our giant aircraft. I do not presume to understand why you have been in a vile mood since you touched down at Enterprises, but I can assure you that we are doing what we can to get this new observation system working, up in the air and to try to see what it is that the federal Government would seemingly rather just blast away at rather than to give us the time to understand if it is a threat or not. Your participation was not requested. But, your cooperation and at least a little civility are now being formally requested. If you can’t

provide us with that I will contact Secretary Chan immediately and tell her of your attitude and refusal to be part of the team. Good day!”

He stalked out of the canteen to the sound of Millicent Brossard’s sputtering.

Outside, Tom leaned up against the building, took a deep breath and shuddered. At nineteen he was not used to speaking to someone almost twice his age in such a tone. He was just considering how fortunate he had been in keeping both his temper and his choice of words controlled when the door opened next to him. Ms. Brossard stepped out and stood there, hands on hips, breathing heavily. Her face was red and she looked angry as well as frustrated. Her whole body was shaking.

She looked about to say something when a single tear cascaded down her left cheek. Tom saw it and was going to apologize for his angry rant when she spoke. Rather than being harsh and angry her voice was quiet and small like that of a little girl.

“Last night I was informed by my fiancé, or rather my ex-fiancé, that our relationship was at an end. This occurred exactly thirty days before our planned wedding day and was a total surprise to me. I am thirty-seven and have never been married. The first man who showed interest in me for anything other than a quick fling has now let me know that I am entirely to blame for the break-up. My attitude *and* my job.”

Before Tom could say anything, she held up a warning finger.

“After university I found no employment in my chosen

field, so I took a low-paying but potentially-important job with the Government in Washington. Within months I discovered the secret of success; men must be gregarious and willing to work ten-hour days while women must be cold, calculating and work fourteen-hour days. Friendships do not work because you frequently find yourself being considered next to one of those friends for the same jobs. Whoever gets the job loses the friends.”

As she took a few breaths, Tom softly said, “I honestly know what it takes. We work closely with lots of Government agencies, departments and the military. I also know that while some sort of emotional shell is necessary, opening it up periodically will keep a person from asphyxiating.” He recalled something she had said, so asked, “What *was* your educational background?”

“I have a degree in Electrical Engineering from Dartmouth,” she sighed giving Tom a look that practically screamed of her feeling lost.

Tom’s mouth went agape. “You’ve got a double-E degree?”

She nodded.

He reached out and gently grabbed her right wrist. “Then boy can I use you. Come with me.” With that, he pulled her along and over to a second building to the right of the Admin structure. They entered a doorway marked **SUPPLIES** where Tom spoke with a woman behind a counter, turning and pointing at Millicent.

The woman motioned to her. “Come with me, dear. We’ll get you set up for this stinking desert weather.”

When Ms. Brossard looked curiously at Tom, he

pointed to his own forehead, then at hers. “You’re practically pouring sweat in that hot suit. Lannie here will get you into one of our lightweight jumpsuits. Then, you and I are going to rebuild that circuit board.”

He was surprised when, fifteen minutes later, an attractive woman looking a bit like Millicent Brossard—but in one of the light gray uni-suits favored by employees at The Citadel, and with her hair now more shaggy and slightly damp—stepped out of the door next to the counter. What was most striking was the small smile that was now showing instead of the scowl.

Lannie looked at her proudly. “If she was some sort of librarian in an old movie, now would be the time for someone to tell her that with her hair down and her glasses off, she looks positively ravishing.”

Tom thought that he wouldn’t go that far, but the change was startling and all for the good.

“Ms. Brossard—”

“I’m off the clock as of now, Mr. Swift. Call me Millie.”

“Okaaaayyyyy... Millie. I’m Tom. Let’s go to the electronics shop and see about that board.”

She proved to be more than a capable assistant. Her skills with stuffing components onto the board and then soldering them together were almost on a par with Tom’s. She even suggested that if the original card had failed, it might be wise to build two replacements so they would have another one in case the first also went bad.

Side-by-side they constructed the cards and chatted. By the time they finished two hours later Tom had begun to take a true liking to the woman.

“If you ever want to get out to the Government business and back to your chosen field, Swift Enterprises is always looking for really skilled engineers. You would be a welcome addition,” he told her, making her redden slightly at the implied compliment.

Early the following morning everyone climbed back onboard the *Sky Queen* and headed up to sixty-five thousand feet. Tom had privately briefed the others to let them know to give Millie Brossard a second chance. He was pleased when each of them greeted her as if she had never been anything other than a welcome guest.

The plan was to remain at altitude for the entire day, trying to ascertain what it was out in the distance that was causing the three separate types of phenomena.

With Tom as the controls of the new camera system and Millie Brossard observing from a chair next to him, he directed Bud and Hank up in the cockpit to the appropriate location. They rose up and into morning light that would not touch the area around The Citadel for another hour.

Tom trained the cameras at the approximate area of interest. He was barely surprised to find that the infrared spectrum was picking up an area nearly the size of a football field where the ground temperature was a few degrees warmer than the surrounding area. Millie looked at him with concern, but Tom only shook his head and told her, “It could be anything from rocks that are holding a little more heat from yesterday to an underground hot spring.”

As the sun came up they got their first real surprise. Even though the camera system gave him good resolution

it could not discern what began happening on the ground. Or, with the ground; Tom couldn't be sure. It began to undulate, moving around in an incalculable pattern, or lack of pattern. Tom radioed to the control tower and asked them what they could see.

“Nothing, skipper. Whatever you're seeing must be just over that slight rise out there and that is hiding it from us. Do you want us to head out there?”

“No. The same disappearing act will just happen again. No, we'll stay up here and try to eek out a little more resolution.”

He and Millie Brossard began discussing ways to make either adjustments or improvements to the system. One of these had to do with using two video processing circuits in tandem. “The first one does what it is doing right now,” she said, “and the other one should take that data and reprocess it at an even greater resolution.”

“I thought of doing that,” Tom explained, “but the simulation I ran in the computer said that a secondary processor would just reprocess the output from the first one at the same resolution and even introduce some small degradation to the signal.” He shrugged at her.

“It might, if used exactly like hooking two identical train cars together, but what if the first card is running at one-hundred-twenty Hertz and the second at two-hundred-forty Hertz? I read a paper from MIT last year that was talking about how someone might improve HD television. The best sets already quadruple the normal sixty Hertz refresh rate, but this doctorate student theorized that if you gave it a higher refresh to start with you could get an even greater resolution to the refresh at the top end.”

Tom thought a moment and then smiled at her. “Can you put that circuitry together for me?” he asked.

“Well, we’d have to go back down and probably miss most of the day, but I think so,” she replied.

“We won’t have to go back down,” he said standing up and taking her hand. She allowed him to pull her up and out into the hall. They headed back to the large room where Tom had outfitted six different cubicles. He ushered her into the electronics cubicle where her mouth opened and closed but no words came out. She was stunned at how complete it was.

After a brief tour of what the cube had to offer and showing her the storage cabinets full of electronic supplies and pre-built circuits, she simply nodded. “Give me four hours... maybe five, and I’ll have the circuit board ready,” she promised.

He brought her a breakfast sandwich at nine and a portion of Chow Winkler’s homemade lasagna at lunch time, but he left her alone.

The mid-day dust storm—more a low-lying blanket of light dust—came at about two in the afternoon, lasting less than an hour and totally obscuring any possibility of seeing what was causing it.

At four, Millie came back up to the room where Tom was trying to make minor adjustments to the equipment. She handed him a pair of circuit boards with a small metal box between them. “I’m pretty sure this will fit inside. If I remember the layout correctly, that is.”

“Will it work?” Tom asked with a smile.

“Only time will tell. It’s a real bodge job even with the

excellent facilities onboard. If I had a week and a few other components I could do better.” She stretched and Tom heard at least three distinct pops as her vertebrae realigned. It was a sound that made him wince.

Sundown would be at eight-fifteen that evening so the light show might begin as early as seven-thirty. They had the new circuits installed and powered up by seven-ten.

Taking a deep breath, Tom said, “Well, Millie. Here goes—” and he reached out and turned the camera array on. The results were immediate and disappointing. Rather than a better picture, it was now cloudy and grainy.

Looking at the 42-inch monitor, Millie let out a groan and slumped in her seat.

Tom was about to say something when it occurred to him that it might not be the camera or the computer working poorly. It might be that it was all working too well. He tapped out a few commands and moved a joystick backward, pulling the focus back out.

Success! The picture cleared and they could make out rocks and prairie grass clumps.

“It got us in so close that we were seeing an unfocussed view of the dirt,” Tom said gleefully. He made several more adjustments and was satisfied that he had the correct area in view. “Your circuit is giving us about six-inch resolution.”

In an instant he believed he knew exactly what was going on down on the desert surface, but he wanted to wait for it to be proved.

Ten minutes later, while Tom, Millie and now Art and

Gary, looked at the large screen above the console, the first of several hundred prairie dogs heads popped out of the many, many holes now visible in the ground. They all turned and faced the same direction—toward the sun that was behind the main buildings at The Citadel—watching as it set. Even from the great altitude and angle Tom and the others could tell that their eyes were aglow from the reflected light.

“My guess is that in the mornings we are hearing them wake up and start to go about their business and that’s sounding like the thrum of heartbeats. The dust comes out in mid-day as the heat causes hotter air in the upper chambers to rise and taking dust with it. If we look around down there my guess is that we find a number of ventilation holes in a very shady place not too far away. They are very good at designing self-ventilating burrows.”

“And,” Hank said, picking up the narrative, “the evening lights have been them just enjoying the sight of watching the sun go down.”

“Mystery solved!” Millie said, cheerfully.

EPILOG

BUD WALKED into the large electronics lab where Tom and Millie Brossard were busy putting the final touches to the final version of Tom’s amazing video camera system.

She had been working at Enterprises for two weeks, ever since her two-weeks notice at the Department of The Interior had been up.

“Hey, kids,” he called out. “Success?”

“Absolutely, flyboy,” Tom replied. “Thanks to Swift Enterprises’ newest hire, we’ve been able to totally rebuild the system using the compound lens system Sandy suggested and Millie’s new circuit, the Brossard Video Multiplexer. She’s also given this a name I think even you will agree to. Tell him,” he directed the woman.

“Well, it is what my cousin in London would call ‘an amazing bit of kit,’ and I agree. But, I told Tom here that this has got to be called the Swift SuperSight Camera System.”

“And, I shortened it to just the SuperSight,” Tom declared. “Issues? Problems? Comments?”

Bud grinned and shook his head. “A lot better than *Sneaky Pecky* that I was going to suggest!”