Pushbutton War

Joseph Paul Martino

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Author: Joseph P. Martino

Illustrator: Schoenherr

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By JOSEPH P. MARTINO

Illustrated by Schoenherr

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In one place, a descendant of the Vikings rode a ship such as Lief never dreamed of; from another, one of the descendants of the Caesars, and here an Apache rode a steed such as never roamed the plains. But they were warriors all.

The hatch swung open, admitting a blast of Arctic air and a man clad in a heavy, fur-lined parka. He quickly closed the hatch and turned to the man in the pilot's couch.

"O.K., Harry. I'll take over now. Anything to report?"

"The heading gyro in the autopilot is still drifting. Did you write it up for Maintenance?"

"Yeah. They said that to replace it they'd have to put the ship in the hangar, and it's full now with ships going through periodic inspection. I guess we'll have to wait. They can't just give us another ship, either. With the hangar full, we must be pretty close to the absolute minimum for ships on the line and ready to fly."

"O.K. Let me check out with the tower, and she'll be all yours." He thumbed the intercom button and spoke into the mike: "RI 276 to tower. Major Lightfoot going off watch."

When the tower acknowledged, he began to disconnect himself from the ship. With smooth, experienced motions, he disconnected the mike cable, oxygen hose, air pressure hose, cooling air hose, electrical heating cable, and dehumidifier hose which connected his flying suit to the ship. He donned the parka and gloves his relief had worn, and stepped through the hatch onto the gantry crane elevator. Even through the heavy parka, the cold air had a bite to it. As the elevator descended, he glanced to the south, knowing as he did so that there would be nothing to see. The sun had set on November 17th, and was not due up for three more weeks. At noon, there would be a faint glow on the southern horizon, as the sun gave a reminder of its existence, but now, at four in the morning, there was nothing. As he stepped off the elevator, the ground crew prepared to roll the gantry crane away from the ship. He opened the door of the waiting personnel carrier and swung aboard. The inevitable cry of "close that door" greeted him as he entered. He brushed the parka hood back from his head, and sank into the first empty seat. The heater struggled valiantly with the Arctic cold to keep the interior of the personnel carrier at a tolerable temperature, but it never seemed able to do much with the floor. He propped his feet on the footrest of the seat ahead of him, spoke to the other occupant of the seat.

"Hi, Mike."

"Hi, Harry. Say, what's your watch schedule now?"

"I've got four hours off, back on for four, then sixteen off. Why?"

"Well, a few of us are getting up a friendly little game before we go back on watch. I thought you might want to join us."

"Well, I—"

"Come on, now. What's your excuse this time for not playing cards?"

"To start with, I'm scheduled for a half hour in the simulator, and another half hour in the procedural trainer. Then if I finish the exam in my correspondence course, I can get it on this week's mail plane. If I don't get it in the mail now, I'll have to wait until next week."

"All right, I'll let you off this time. How's the course coming?"

"This is the final exam. If I pass, I'll have only forty-two more credits to go before I have my degree in Animal Husbandry."

"What on earth do you want with a degree like that?"

"I keep telling you. When I retire, I'm going back to Oklahoma and raise horses. If I got into all the card games you try to organize, I'd retire with neither the knowledge to run a horse ranch, nor the money to start one."

"But why raise horses? Cabbages, I can see. Tomatoes, yes. But why horses?"

"Partly because there's always a market for them, so I'll have a fair amount of business to keep me eating regularly. But mostly because I like horses. I practically grew up in the saddle. By the time I was old enough to do much riding, Dad had his own ranch, and I helped earn my keep by working for him. Under those circumstances, I just naturally learned to like horses."

"Guess I never thought of it like that. I was a city boy myself. The only horses I ever saw were the ones the cops rode. I didn't get much chance to became familiar with the beasts."

"Well, you don't know what you missed. It's just impossible to describe what it's like to use a high-spirited and well-trained horse in your daily work. The horse almost gets to sense what you want him to do next. You don't have to direct his every move. Just a word or two, and a touch with your heel or the pressure of your knee against his side, and he's got the idea. A well-trained horse is perfectly capable of cutting a particular cow out of a herd without any instructions beyond showing him which one you want."

"It's too bad the Army did away with the cavalry. Sounds like you belong there, not in the Air Force."

"No, because if there's anything I like better than riding a good horse, it's flying a fast and responsive airplane. I've been flying fighters for almost seventeen years now, and I'll be quite happy to keep flying them as long as they'll let me. When I can't fly fighters any more, then I'll go back to horses. And much as I like horses, I hope that's going to be a long time yet."

"You must hate this assignment, then. How come I never hear you complain about it?"

"The only reason I don't complain about this assignment is that I volunteered for it. And I've been kicking myself ever since. When I heard about the Rocket Interceptors, I was really excited. Imagine a plane fast enough to catch up with an invading ballistic missile and shoot it down. I decided this was for me, and jumped at the assignment. They sounded like the hot fighter planes to end all hot fighter planes. And what do I find? They're so expensive to fly that we don't get any training missions. I've been up in one just once, and that was my familiarization flight, when I got into this assignment last year. And then it was only a ride in the second seat of that two-seat version they use for checking out new pilots. I just lay there through the whole flight. And as far as I could see, the pilot didn't do much more. He just watched things while the autopilot did all the work."

"Well, don't take it too hard. You might get some flights."

"That's true. They do mistake a meteor for a missile now and then. But that happens only two or three times a year. That's not enough. I want some regular flying. I haven't got any flying time in for more than a year. The nearest I come to flying is my time in the procedural trainer, to teach me what buttons to push, and in the simulator, to give me the feel of what happens when I push the buttons."

"That's O.K. They still give you your flying pay."

"I know, but that's not what I'm after. I fly because I love flying. I use the flying pay just to keep up the extra premiums the insurance companies keep insisting on so long as I indulge my passion for fighter planes."

"I guess about the only way you could get any regular flying on this job would be for a war to come along."

"That's about it. We'd fly just as often as they could recover our ships and send us back up here for another launch. And that would go on until the economy on both sides broke down so far they couldn't make any more missiles for us to chase, or boosters to send us up after them. No thanks. I don't want to fly that badly. I like civilization."

"In the meantime, then, you ought to try to enjoy it here. Where else can you spend most of your working hours lying flat on your back on the most comfortable couch science can devise?"

"That's the trouble. Just lying there, where you can't read, write, talk, or listen. It might be O.K. for a hermit, but I'd rather fly fighter planes. Here's the trainer building. I've got to get out."

Seven o'clock. Harry Lightfoot licked the flap on the envelope, sealed it shut, stuck some stamps on the front, and scrawled "AIR MAIL" under the stamps. He dropped the letter into the "STATESIDE" slot. The exam hadn't been so bad. What did they think he was, anyway? A city slicker who had never seen a live cow in his life? He ambled into the off-duty pilots' lounge. He had an hour to kill before going on watch, and this was as good a place as any to kill it. The lounge was almost empty. Most of the pilots must have been asleep. They couldn't all be in Mike's game. He leaned over a low table in the center of the room and started sorting through the stack of magazines.

"Looking for anything in particular, Harry?"

He turned to face the speaker. "No, just going through these fugitives from a dentist's office to see if there's anything I haven't read yet. I can't figure out where all the new magazines go. The ones in here always seem to be exactly two months old."

"Here's this month's *Western Stories*. I just finished it. It had some pretty good stories in it."

"No, thanks, the wrong side always wins in that one."

"The wrong ... oh, I forgot. I guess they don't write stories where your side wins."

"It's not really a question of 'my side'. My tribe gave up the practice of tribal life and tribal customs over fifty years ago. I had the same education in a public school as any other American child. I read the same newspapers and watch the same TV shows as anyone else. My Apache ancestry means as little to me as the nationality of his immigrant ancestors means to the average American. I certainly don't consider myself to be part of a nation still at war with the 'palefaces'."

"Then what's wrong with Western stories where the United States Cavalry wins?"

"That's a different thing entirely. Some of the earliest memories I have are of listening to my grandfather tell me about how he and his friends fought against the horse-soldiers when he was a young man. I imagine he put more romance than historical accuracy into his stories. After all, he was telling an eager kid about the adventures he'd had over fifty years before. But at any rate, he definitely fixed my emotions on the side of the Indians and against the United States Cavalry. And the fact that culturally I'm descended from the Cavalry rather than from the Apache Indians doesn't change my emotions any."

"I imagine that would have a strong effect on you. These stories are really cheering at the death of some of your grandfather's friends."

"Oh, it's worse than that. In a lot of hack-written stories, the Indians are just convenient targets for the hero to shoot at while the author gets on with the story. Those stories are bad enough. But the worst are the ones where the Indians are depicted as brutal savages with no redeeming virtues. My grandfather had an elaborate code of honor which governed his conduct in battle. It was different from the code of the people he fought, but it was at least as rigid, and deviations from it were punished severely. He'd never read Clausewitz. To him, war wasn't an 'Instrument of National Policy'. It was a chance for the individual warrior to demonstrate his skill and bravery. His code put a high premium on individual courage in combat, and the weakling or coward was crushed contemptuously. I don't even attempt to justify the Indian treatment of captured civilians and noncombatants, but nevertheless, I absorbed quite a few of my grandfather's ideals and views about war, and it's downright disgusting to see him so falsely represented by the authors of the run-of-the-mill Western story or movie."

"Well, those writers have to eat, too. And maybe they can't hold an honest job. Besides, you don't still look at war the way your grandfather did, do you? Civilization requires plenty of other virtues besides courage in combat, and we have plenty of better ways to display those virtues. And the real goal of the fighting man is to be alive after the war so he can go home to enjoy the things he was fighting for."

"No, I hadn't been in Korea long before I lost any notions I might have had of war as the glorious adventure my grandfather described it to be. It's nothing but a bloody business, and should be resorted to only if everything else fails. But I still think the individual fighter could do a lot worse than follow the code that my grandfather believed in."

"That's so, especially since the coward usually gets shot anyway; if not by the enemy, then by his own side. Hey, it's getting late! I've got some things to do before going on watch. Be seeing you."

"O.K. I'll try to find something else here I haven't read yet."

Eight o'clock. Still no sign of the sun. The stars didn't have the sky to themselves, however. Two or three times a minute a meteor would be visible, most of them appearing to come from a point about halfway between the Pole Star and the eastern horizon. Harry Lightfoot stopped the elevator, opened the hatch, and stepped in.

"She's all yours, Harry. I've already checked out with the tower."

"O.K. That gyro any worse?"

"No, it seems to have steadied a bit. Nothing else gone wrong, either."

"Looks like we're in luck for a change."

"Let me have the parka and I'll clear out. I'll think of you up here while I'm relaxing. Just imagine; a whole twenty-four hours off, and not even any training scheduled."

"Someone slipped up, I'll bet. By the way, be sure to look at the fireworks when you go out. They're better now than I've seen them at any time since they started."

"The meteor shower, you mean? Thanks. I'll take a look. I'll bet they're really cluttering up the radar screens. The Launch Control Officer must be going quietly nuts."

The Launch Control Officer wasn't going nuts. Anyone who went nuts under stress simply didn't pass the psychological tests required of prospective Launch Control Officers. However, he was decidedly unhappy. He sat in a dimly-lighted room, facing three oscilloscope screens. On each of them a pie-wedge section was illuminated by a white line which swept back and forth like a windshield wiper. Unlike a windshield wiper, however, it put little white blobs on the screen, instead of removing them. Each blob represented something which had returned a radar echo. The center screen was his own radar. The outer two were televised images of the radar screens at the stations a hundred miles on either side of him, part of a chain of stations extending from Alaska to Greenland. In the room, behind him, and facing sets of screens similar to his, sat his assistants. They located the incoming objects on the screen and set automatic computers to determining velocity, trajectory, and probable impact point.

This information appeared as coded symbols beside the tracks on the center screen of the Launch Control Officer, as well as all duplicate screens. The Launch Control Officer, and he alone, had the responsibility to determine whether the parameters for a given track were compatible with an invading Intercontinental Ballistic Missile, or whether the track represented something harmless. If he failed to launch an interceptor at a track that turned out to be hostile, it meant the death of an American city. However, if he made a habit of launching interceptors at false targets, he would soon run out of interceptors. And only under the pressure of actual war would the incredible cost of shipping in more interceptors during the winter be paid without a second thought. Normally, no more could be shipped in until spring. That would mean a gap in the chain that could not be covered adequately by interceptors from the adjacent stations.

His screens were never completely clear. And to complicate things, the Quadrantids, which start every New Year's Day and last four days, were giving him additional trouble. Each track had to be analyzed, and the presence of the meteor shower greatly increased the number of tracks he had to worry about. However, the worst was past. One more day and they would be over. The clutter on his screens would drop back to normal.

Even under the best of circumstances, his problem was bad. He was hemmed in on one side by physics, and on the other by arithmetic. The most probable direction for an attack was from over the Pole. His radar beam bent only slightly to follow the curve of the Earth. At great range, the lower edge of the beam was too far above the Earth's surface to detect anything of military significance. On a minimum altitude trajectory, an ICBM aimed for North America would not be visible until it reached 83° North Latitude on the other side of the Pole. One of his interceptors took three hundred eighty-five seconds to match trajectories with such a missile, and the match occurred only two degrees of latitude south of the station. The invading missile traveled one degree of latitude in fourteen seconds. Thus he had to launch the interceptor when the missile was twenty-seven degrees from intercept. This turned out to be 85° North Latitude on the other side of the Pole. This left him at most thirty seconds to decide whether or not to intercept a track crossing the Pole. And if several tracks were present, he had to split that time among them. If too many tracks appeared, he would have to turn over portions of the sky to his assistants, and let them make the decisions about launching. This would happen only if he felt an attack was in progress, however.

Low-altitude satellites presented him with a serious problem, since there is not a whole lot of difference between the orbit of such a satellite and the trajectory of an ICBM. Fortunately most

satellite orbits were catalogued and available for comparison with incoming tracks. However, once in a while an unannounced satellite was launched, and these could cause trouble. Only the previous week, at a station down the line, an interceptor had been launched at an unannounced satellite. Had the pilot not realized what he was chasing and held his fire, the international complications could have been serious. It was hard to imagine World War III being started by an erroneous interceptor launching, but the State Department would be hard put to soothe the feelings of some intensely nationalistic country whose expensive new satellite had been shot down. Such mistakes were bound to occur, but the Launch Control Officer preferred that they be made when someone else, not he, was on watch. For this reason he attempted to anticipate all known satellites, so they would be recognized as soon as they appeared.

According to the notes he had made before coming on watch, one of the UN's weather satellites was due over shortly. A blip appeared on the screen just beyond the 83° latitude line, across the Pole. He checked the time with the satellite ephemeris. If this were the satellite, it was ninety seconds early. That was too much error in the predicted orbit of a well-known satellite. Symbols sprang into existence beside the track. It was not quite high enough for the satellite, and the velocity was too low. As the white line swept across the screen again, more symbols appeared beside the track. Probable impact point was about 40° Latitude. It certainly wasn't the satellite. Two more blips appeared on the screen, at velocities and altitudes similar to the first. Each swipe of the white line left more new tracks on the screen. And the screens for the adjacent stations were showing similar behavior. These couldn't be meteors.

The Launch Control Officer slapped his hand down on a red push-button set into the arm of his chair, and spoke into his mike. "Red Alert. Attack is in progress." Then switching to another channel, he spoke to his assistants: "Take your preassigned sectors. Launch one interceptor at each track identified as hostile." He hadn't enough interceptors to double up on an attack of this size, and a quick glance at the screens for the adjacent stations showed he could expect no help from them. They would have their hands full. In theory, one interceptor could handle a missile all by itself. But the theory had never been tried in combat. That lack was about to be supplied.

Harry Lightfoot heard the alarm over the intercom. He vaguely understood what would happen before his launch order came. As each track was identified as hostile, a computer would be assigned to it. It would compute the correct time of launch, select an interceptor, and order it off the ground at the correct time. During the climb to intercept, the computer would radio steering signals to the interceptor, to assure that the intercept took place in the most efficient fashion. He knew RI 276 had been selected when a green light on the instrument panel flashed on, and a clock dial started indicating the seconds until launch. Just as the clock reached zero, a relay closed behind the instrument panel. The solid-fuel booster ignited with a roar. He was squashed back into his couch under four gees' acceleration.

Gyroscopes and acceleration-measuring instruments determined the actual trajectory of the ship; the navigation computer compared the actual trajectory with the trajectory set in before take-off; when a deviation from the pre-set trajectory occurred, the autopilot steered the ship back to the proper trajectory. As the computer on the ground obtained better velocity and position information about the missile from the ground radar, it sent course corrections to the ship, which were accepted in the computer as changes to the pre-set trajectory. The navigation computer hummed and buzzed; lights flickered on and off on the instrument panel; relays clicked behind the panel. The ship steered itself toward the correct intercept point. All this automatic operation was required because no merely human pilot had reflexes fast enough to carry out an intercept at twenty-six thousand feet per second. And even had his reflexes been fast enough, he could not have done the precise piloting required while being pummeled by this acceleration.

As it was, Major Harry Lightfoot, fighter pilot, lay motionless in his acceleration couch. His face was distorted by the acceleration. His breathing was labored. Compressed-air bladders in the legs of his gee-suit alternately expanded and contracted, squeezing him like the obscene embrace of some giant snake, as the gee-suit tried to keep his blood from pooling in his legs. Without the gee-suit, he would have blacked out, and eventually his brain would have been permanently damaged from the lack of blood to carry oxygen to it.

A red light on the instrument panel blinked balefully at him as it measured out the oxygen he required. Other instruments on the panel informed him of the amount of cooling air flowing through his suit to keep his temperature within the tolerable range, and the amount of moisture the dehumidifier had to carry away from him so that his suit didn't become a steam-bath. He was surrounded by hundreds of pounds of equipment which added nothing to the performance of the ship; which couldn't be counted as payload; which cut down on the speed and altitude the ship

might have reached without them. Their sole purpose was to keep this magnificent high-performance, self-steering machine from killing its load of fragile human flesh.

At one hundred twenty-eight seconds after launch, the acceleration suddenly dropped to zero. He breathed deeply again, and swallowed repeatedly to get the salty taste out of his throat. His stomach was uneasy, but he wasn't spacesick. Had he been prone to spacesickness, he would never have been accepted as a Rocket Interceptor pilot. Rocket Interceptor pilots had to be capable of taking all the punishment their ships could dish out.

He knew there would be fifty seconds of free-fall before the rockets fired again. One solid-fuel stage had imparted to the ship a velocity which would carry it to the altitude of the missile it was to intercept. A second solid-fuel stage would match trajectories with the missile. Final corrections would be made with the liquid-fuel rockets in the third stage. The third stage would then become a glider which eventually would carry him back to Earth.

Before the second stage was fired, however, the ship had to be oriented properly. The autopilot consulted its gyros, took some star sights, and asked the navigation computer some questions. The answers came back in seconds, an interval which was several hours shorter than a human pilot would have required. Using the answers, the autopilot started to swing the ship about, using small compressed-gas jets for the purpose. Finally, satisfied with the ship's orientation, the autopilot rested. It patiently awaited the moment, precisely calculated by the computer on the ground, when it would fire the second stage.

Major Harry Lightfoot, fighter pilot, waited idly for the next move of his ship. He could only fume inwardly. This was no way for an Apache warrior to ride into battle. What would his grandfather think of a steed which directed itself into battle and which could kill its rider, not by accident, but in its normal operation? He should be actively hunting for that missile, instead of lying here, strapped into his couch so he wouldn't hurt himself, while the ship did all the work.

As for the missile, it was far to the north and slightly above the ship. Without purpose of its own, but obedient to the laws of Mr. Newton and to the wishes of its makers, it came on inexorably. It was a sleek aluminum cylinder, glinting in the sunlight it had just recently entered. On one end was a rocket-motor, now silent but still warm with the memory of flaming gas that had poured forth from it only minutes ago. On the other end was a sleek aerodynamic shape, the product of thousands of hours of design work. It was designed to enter the atmosphere at meteoric speed, but without burning up. It was intended to survive the passage through the air and convey its contents intact to the ground. The contents might have been virulent bacteria or toxic gas, according to the intentions of its makers. Among its brothers elsewhere in the sky this morning, there were such noxious loads. This one, however, was carrying the complex mechanism of a hydrogen bomb. Its destination was an American city; its object to replace that city with an expanding cloud of star-hot gas.

Suddenly the sleek cylinder disappeared in a puff of smoke, which quickly dissipated in the surrounding vacuum. What had been a precisely-built rocket had been reduced, by carefully-placed charges of explosive, to a collection of chunks of metal. Some were plates from the skin and fuel tanks. Others were large lumps from the computer-banks, gyro platform, fuel pumps, and other more massive components. This was not wanton destruction, however. It was more careful planning by the same brains which had devised the missile itself. To a radar set on the ground near the target, each fragment was indistinguishable from the nose cone carrying the warhead. In fact, since the fragments were separating only very slowly, they never would appear as distinct objects. By the time the cloud of decoys entered the atmosphere, its more than two dozen members would appear to the finest radar available on the ground as a single echo twenty-five miles across. It would be a giant haystack in the sky, concealing the most deadly needle of all time. No ground-controlled intercept scheme had any hope of selecting the warhead from among that deceptive cloud and destroying it.

The cloud of fragments possessed the same trajectory as the missile originally had. At the rate it was overtaking RI 276, it would soon pass the ship by. The autopilot of RI 276 had no intention of letting this happen, of course. At the correct instant, stage two thundered into life, and Harry Lightfoot was again smashed back into his acceleration couch. Almost absentmindedly, the ship continued to minister to his needs. Its attention was focused on its mission. After a while, the ground computer sent some instructions to the ship. The navigation computer converted these into

a direction, and pointed a radar antenna in that direction. The antenna sent forth a stream of questing pulses, which quickly returned, confirming the direction and distance to the oncoming cloud of missile fragments. A little while later, fuel pumps began to whine somewhere in the tail of the ship. Then the acceleration dropped to zero as the second-stage thrust was terminated. There was a series of thumps as explosive bolts released the second stage. The whine of the pumps dropped in pitch as fuel gushed through them, and acceleration returned in a rush. The acceleration lasted for a few seconds, tapered off quickly, and ended. A light winked on on the instrument panel as the ship announced its mission was accomplished.

Major Harry Lightfoot, fighter pilot, felt a glow of satisfaction as he saw the light come on. He might not have reflexes fast enough to pilot the ship up here; he might not be able to survive the climb to intercept without the help of a lot of fancy equipment; but he was still necessary. He saw still one step ahead of this complex robot which had carried him up here. It was his human judgment and his ability to react correctly in an unpredictable situation which were needed to locate the warhead from among the cluster of decoys and destroy it. This was a job no merely logical machine could do. When all was said and done, the only purpose for the existence of this magnificent machine was to put him where he was now; in the same trajectory as the missile, and slightly behind it.

Harry Lightfoot reached for a red-handled toggle switch at the top of the instrument panel, clicked it from AUTO to MANUAL, and changed his status from passenger to pilot. He had little enough time to work. He could not follow the missile down into the atmosphere; his ship would burn up. He must begin his pull-out at not less than two hundred miles altitude. That left him one hundred eighty-three seconds in which to locate and destroy the warhead. The screen in the center of his instrument panel could show a composite image of the space in front of his ship, based on data from a number of sensing elements and detectors. He switched on an infrared scanner. A collection of spots appeared on the screen, each spot indicating by its color the temperature of the object it represented. The infrared detector gave him no range information, of course. But if the autopilot had done its job well, the nearest fragment would be about ten miles away. Thus even if he set off the enemy warhead, he would be safe. At that range the ship would not suffer any structural damage from the heat, and he could be down on the ground and in a hospital before any radiation effects could become serious.

He reflected quickly on the possible temperature range of the missile components. The missile had been launched from Central Asia, at night, in January. There was no reason to suppose that the warhead had been temperature-controlled during the pre-launch countdown. Thus it probably was at the ambient temperature of the launch site. If it had been fired in the open, that might be as low as minus 70° F. Had it been fired from a shelter, that might be as high as 70° F. To leave a safety margin, he decided to reject only those objects outside the range plus or minus 100° F. There were two fragments at 500° F. He rejected these as probably fragments of the engine. Six more exhibited a temperature of near minus 320° F. These probably came from the liquid oxygen tanks. They could be rejected. That eliminated eight of the objects on the screen. He had nineteen to go. It would be a lot slower for the rest, too.

He switched on a radar transmitter. The screen blanked out almost completely. The missile had included a micro-wave transmitter, to act as a jammer. It must have been triggered on by his approach. It obviously hadn't been operating while the ship was maneuvering into position. Had it been transmitting then, the autopilot would simply have homed on it. He switched the radar to a different frequency. That didn't work. The screen was still blank, indicating that the jammer was sweeping in frequency. He next tried to synchronize his radar pulses with the jammer, in order to be looking when it was quiet. The enemy, anticipating him, had given the jammer a variable pulse repetition rate. He switched off the transmitter, and scanned the radar antenna manually. He slowly swung it back and forth, attempting to fix the direction of the jammer by finding the direction of maximum signal strength. He found that the enemy had anticipated him again, and the jammer's signal strength varied. However, he finally stopped the antenna, satisfied that he had it pointed at the jammer. The infrared detector confirmed that there was something in the direction the antenna pointed, but it appeared too small to be the warhead.

He then activated the manual piloting controls. He started the fuel pumps winding up, and swung the ship to point normal to the line-of-sight to the jammer. A quick blast from the rockets sent the image of the jammer moving sideways across the screen. But, of greater importance, two other objects moved across the screen faster than the jammer, indicating they were nearer the ship than was the jammer. He picked the one which appeared the nearest to him, and with a series of maneuvers and blasts from the rockets placed the object between himself and the jammer. He switched the radar on again. Some of the jammer signal was still leaking through, but the object, whatever it was, made an effective shield. The radar images were quite sharp and clear.

He glanced at the clock. Nullifying the jammer had cost him seventy-five seconds. He'd have to hurry, in order to make up for that time. The infrared detector showed two targets which the radar insisted weren't there. He shifted radar frequency. They still weren't there. He decided they were small fragments which didn't reflect much radar energy, and rejected them. He set the radar to a linearly polarized mode. Eight of the targets showed a definite amplitude modulation on the echo. That meant they were rotating slowly. He switched to circular polarization, to see if they presented a constant area to the radar beam. He compared the echoes for both modes of polarization. Five of the targets were skin fragments, spinning about an axis skewed with respect to the radar beam. These he rejected. Two more were structural spars. They couldn't conceal a warhead. He rejected them. After careful examination of the fine structure of the echo from the last object, he was able to classify it as a large irregular mass, probably a section of computer, waving some cables about. Its irregularity weighed against its containing the warhead. Even if it didn't burn up in the atmosphere, its trajectory would be too unpredictable.

He turned to the rest of the targets. Time was getting short. He extracted every conceivable bit of information out of what his detectors told him. He checked each fragment for resonant frequencies, getting an idea of the size and shape of each. He checked the radiated infrared spectrum. He checked the decrement of the reflected radar pulse. Each scrap of information was an indication about the identity of the fragments. With frequent glances at the clock, constantly reminding him of how rapidly his time was running out, he checked and cross-checked the data coming in to him. Fighting to keep his mind calm and his thoughts clear, he deduced, inferred, and decided. One fragment after another, he sorted, discarded, rejected, eliminated, excluded. Until the screen was empty.

Now what? Had the enemy camouflaged the warhead so that it looked like a section of the missile's skin? Not likely. Had he made a mistake in his identification of the fragments? Possibly, but there wasn't time to recheck every fragment. He decided that the most likely event was that the warhead was hidden by one of the other fragments. He swung the ship; headed it straight for the object shielding him from the jammer, which had turned out to be a section from the fuel tank. A short blast from the rockets sent him drifting toward the object. One image on the screen broadened; split in two. A hidden fragment emerged from behind one of the ones he had examined. He rejected it immediately. Its temperature was too low. He was almost upon the fragment shielding him from the jammer. If he turned to avoid it, the jammer would blank-out his radar again. He thought back to his first look at the cloud of fragments. There had been nothing between his shield and the jammer. The only remaining possibility, then, was that the warhead was being hidden from him by the jammer itself. He would have to look on the other side of the jammer, using the ship itself as a shield.

He swung out from behind the shielding fragment, and saw his radar images blotted out. He switched off the radar, and aimed the ship slightly to one side of the infrared image of the jammer. Another blast from the rockets sent him towards the jammer. Without range information from the radar, he would have to guess its distance by noting the rate at which it swept across the screen. The image of the jammer started to expand as he approached it. Then it became dumbbell shaped and split in two.

As he passed by the jammer, he switched the radar back on. That second image was something which had been hidden by the jammer. He looked around. No other new objects appeared on the screen. This had to be the warhead. He checked it anyway. Temperature was minus 40° F. A smile flickered on his lips as he caught the significance of the temperature. He hoped the launching crew had gotten their fingers frozen off while they were going through the countdown. The object showed no anomalous radar behavior. Beyond doubt, it was the warhead.

Then he noted the range. A mere thirteen hundred yards! His own missile carried a small atomic warhead. At that range it would present no danger to him. But what if it triggered the enemy warhead? He and the ship would be converted into vapor within microseconds. Even a partial, low-efficiency explosion might leave the ship so weakened that it could not stand the stresses of return through the atmosphere. Firing on the enemy warhead at this range was not much different from playing Russian Roulette with a fully-loaded revolver.

Could he move out of range of the explosion and then fire? No. There were only twelve seconds left before he had to start the pull-out. It would take him longer than that to get to a safe range, get into position, and fire. He'd be dead anyway, as the ship plunged into the atmosphere and burned up. And to pull out without firing would be saving his own life at the cost of the lives he was under oath to defend. That would be sheer cowardice.

He hesitated briefly, shrugged his shoulders as well as he could inside his flying suit, and snapped a

switch on the instrument panel. A set of cross hairs sprang into existence on the screen. He gripped a small lever which projected up from his right armrest; curled his thumb over the firing button on top of it. Moving the lever, he caused the cross hairs to center on the warhead. He flicked the firing button, to tell the fire control system that *this* was the target. A red light blinked on, informing him that the missile guidance system was tracking the indicated target.

He hesitated again. His body tautened against the straps holding it in the acceleration couch. His right arm became rigid; his fingers petrified. Then, with a convulsive twitch of his thumb, he closed the firing circuit. He stared at the screen, unable to tear his eyes from the streak of light that leaped away from his ship and toward the target. The missile reached the target, and there was a small flare of light. His radiation counter burped briefly. The target vanished from the radar, but the infrared detector insisted there was a nebulous fog of hot gas, shot through with a rain of molten droplets, where the target had been. That was all. He had destroyed the enemy warhead without setting it off. He stabbed the MISSION ACCOMPLISHED button, and flicked the red-handled toggle switch, resigning his status as pilot. Then he collapsed, nerveless, into the couch.

The autopilot returned to control. It signaled the Air Defense network that this hostile track was no longer dangerous. It received instructions about a safe corridor to return to the ground, where it would not be shot at. As soon as the air was thick enough for the control surfaces to bite, the autopilot steered into the safe corridor. It began the slow, tedious process of landing safely. The ground was still a long way down. The kinetic and potential energy of the ship, if instantly transformed into heat, was enough to flash the entire ship into vapor. This tremendous store of energy had to be dissipated without harm to the ship and its occupant.

Major Harry Lightfoot, fighter pilot, lay collapsed in his couch, exhibiting somewhat less ambition than a sack of meal. He relaxed to the gentle massage of his gee-suit. The oxygen control winked reassuringly at him as it maintained a steady flow. The cabin temperature soared, but he was aware of it only from a glance at a thermometer; the air conditioning in his suit automatically stepped up its pace to keep him comfortable. He reflected that this might not be so bad after all. Certainly none of his ancestors had ever had this comfortable a ride home from battle.

After a while, the ship had reduced its speed and altitude to reasonable values. The autopilot requested, and received, clearance to land at its preassigned base. It lined itself up with the runway, precisely followed the correct glide-path, and flared out just over the end of the runway. The smoothness of the touchdown was broken only by the jerk of the drag parachute popping open. The ship came to a halt near the other end of the runway. Harry Lightfoot disconnected himself from the ship and opened the hatch. Carefully avoiding contact with the still-hot metal skin of the ship, he jumped the short distance to the ground. The low purr of a motor behind him announced the arrival of a tractor to tow the ship off the runway.

"You'll have to ride the tractor back with me, sir. We're a bit short of transportation now."

"O.K., sergeant. Be careful hooking up. She's still hot."

"How was the flight, sir?"

"No sweat. She flies herself most of the time."

THE END

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