Admiral's Inspection

Commander Bullard

by Malcolm Jameson, 1891-1945

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It was a new trick from ancient history—the Admiral's Inspection. But man, what an inspection that turned out to be!

"HOW about a snappy round of meteor ball before we eat?"

"You know me," grinned Kingman, the torpedo officer, from the cushions of the transom.

"Swell," said Fraser, gathering up the cards from his solitaire game. Fraser had charge of the auxiliaries and the mercury vapor boilers.

"How about you, Bullard?" Lieutenant Bullard was the latest comer to the Pollux. He had belonged to the mess too short a time for the others to learn much about him.

"Why, sure," said Bullard. He slid a marker into his book—*Hints on Ship-control, Star-class Cruisers*—and laid the volume carefully to one side. "Only I didn't know—" he hesitated, glancing in the direction of the executive officer seated in a wicker chair in a corner of the wardroom.

"In the POLLUX, Bullard," spoke up the exec—Commander Beckley—"keeping fit is as important as anything else you do. If you're inclined to split hairs over the regulations, I'll ease your mind on that score. You are *detailed* to play. That makes it official."

Bullard reddened slightly at the implication he might be a sky lawyer, the bane of ships from time immemorial. But Commander Beckley was smiling pleasantly. He did not mean it that way; he was employing his own method of initiating his newest officer into the usage of the ship. It was true that officers were not supposed to leave a ship while under way, but notwithstanding the regulations, Beckley saw no good reason for making them forgo their daily exercise. The POLLUX was swinging lazily in a wide orbit about the Jovian System, her electronic blasts cold and dark, patrolling for routine traffic-control purposes. Forbidding men to go over the side was as senseless a restriction as to prohibit swimming from an anchored ship.

"I think some exercise would do me good, too," yawned Chinnery, chief engineer, stretching languidly. "Count me in."

Chief Watch Officer Moore, who had proposed the game, frowned slightly. That upset the balance; five made unequal teams and there was no one else free. He turned toward the exec with a question on his lips, but Beckley had leaned over and was clicking the intership phone, calling Central Control.

"CC? Put the O.D. on. Carlson? A little game of meteor ball is starting. They need a sixth. You're it. Climb into your suit and report to Mr. Moore on the port boat deck. I'll take over for the duration."

The phone was slammed down with a click. The exec looked up. "You had a question, Moore?"

"Why, no, sir. That is, thank you, sir."

"Half an hour," smiled the exec as he rose to go to Central Control to relieve Carlson.

Bullard glowed inwardly. What a ship! No wonder she was regarded as the happiest home in the sky fleet. Clean, taut as a bowstring, yet friendly. From what he had seen, officers and crew were like one big family. The discipline was excellent—but invisible. One could almost term it voluntary. In the few days he had been aboard, Bullard already sensed the difference between the spirit exhibited on this snappy cruiser of the first line and that on the obsolescent reserve mine-layer he had just left, but it took this incident to make him understand why. It was the difference, in the personalities of those in control of the two ships.

He had no regrets now for leaving the old ASIA, even if he had been chief engineer of her and here he was only a junior officer. As he recalled her meddlesome, old-womanish captain and the endless bickerings of the wardroom, he was aware he was glad to be well out of her. In contrast, the POLLUX had Captain Mike Dongan, aloof and reserved, but capable and invariably pleasant; her exec, despite his air of geniality, held the ship to strict standards of performance; her wardroom officers, for all their pose of flippant indifference, were conscientious in the performance of their duties; her crew, in consequence, were fiercely loyal. All that together made for that prime essential of a "good" ship—esprit de corps—something a man could work for, fight for, die for. There was a new lilt in Bullard's stride as he hurried down the passage to shift into a lightweight spacesuit for the game.

HE made his way to the boat deck, and as he stepped out of the air lock onto the broad fin he was impressed by the size of the huge vessel. Its hull sloped upward and away from him, gray in the dim light of a dwindled sun, and he saw for the first time, the row of alcoves let into the ship's side that sheltered the boats. Those, he knew, were used for the reconnaissance of asteroids or areas too rugged to put the ship down on, or for minor searches, or for rescue expeditions. Star-class cruisers, being designed for all-planet service, were equipped with vertical and horizontal fins to stabilize them when easing into an atmosphere, and the horizontal ones made ideal landing decks for their boats.

Bullard saw that the other players were already gathered at the extreme edge of the fin and behind them two diminutive Ganymedian messboys were struggling with the squat sports-howitzer. As he made his way toward them they fired the first of the two low- velocity luciferin bombs, and in a moment, the two shells bloomed into pale green stars, several miles apart and several miles away—the goals for the game. By the time he had joined Fraser and Kingman on the right, the messboys were loading the mesothorium-coated ball into the howitzer. The game was ready to start.

At a signal from Moore, one of the Ganymedians yanked the lanyard and the glowing ball was hurled out into space, squarely between the goals. In the same moment the six players took off, soaring in swift pursuit behind it, belching thin threads of fire behind them. Ten seconds later the sky to port and above was a maze of streaking, interlacing flames as the players zigzagged to and fro, intent on getting a grip on the ball long enough to propel it toward one or the other of the slowly receding goals.

Commander Beckley watched the fiery skylarking with keen interest. Meteor ball, he thought, as he gazed into the visiplate in CC, was the ideal game for skymen. It was good for the muscles, for although the player had no weight to speak of, he was compelled to put himself through continuous contortions in order to manipulate the flexible, bucking rocket nozzle and still keep an arm free to fend off tackling opponents or to bat the ball along. But far more beneficial was the ingrained sense of tridimensional orientation the game developed, and the capacity to appraise the reaction from the hand-jet impulses. That sense of action and reaction in time, became almost instinctive, giving the player that quality so indispensable in the handling of spaceships—that elusive thing known as the *feel*

of a ship. A man possessing that could, in a pinch, handle his vessel blindfolded or without instruments.

Twice Beckley watched a thin line of flame lash through the cool green blaze of the luciferin goal marker, other lightninglike flashes hard behind. That meant that one of the teams had scored twice—clever work for so short a time. And it was unusual, for although the Polliwogs had many good players, they lacked brilliant ones. Beckley correctly surmised that it must have been Bullard who scored the goals, the two officer-teams were too evenly matched otherwise.

He chuckled as he suddenly realized that now the Polliwogs might snatch another trophy from the Castor Beans, their traditional rivals on the sister cruiser CASTOR. He reached for the long- range televise transmitter on the impulse to call Warlock on the instant and challenge his gang to a game the very next time the two ships fell in together, but as he turned away from the visiplate he noticed the men in the control room silently stiffening to attention. The captain had come in.

Beckley was astonished at the gravity of the skipper's expression, for so far as he knew, all was serene. But at first the captain said nothing. He merely looked thoughtfully about the control room and, seeing his exec in charge and no officer of the deck, he glanced at the visiplate.

"Sound recall," said Captain Mike. "Then read this."

AT a nod from the exec, the man on the signal board closed a key. The wailing buzz it set up in the helmets of the officers flitting about outside would inform them they were wanted on board with all dispatch. Commander Beckley took the proffered signal from the captain's hand and glanced through it, noticing that as he did, Captain Mike was watching him stolidly, giving no hint of what was in his own mind.

"Yes, I saw this," said Beckley. "What is it, a joke?"

"Joke!" snorted the captain. "Apparently you have not heard of the outcome of the CANOPUS' inspection. Do you realize that Joey Dill has been relieved of his command and stuck in the dark on Uranus for a five-year hitch as commandant of that flea-bitten outpost? That every one of his officers is awaiting court-martial on charges ranging from *gross inefficiency* to *culpable negligence?* That the CANOPUS, herself, is practically a wreck and has been ordered to the sky yard on Mars for survey and wholesale repairs? There is nothing funny about that. And now it appears we are next."

Commander Beckley stared again at the innocuous-looking message in his hand. It still looked like a prank fathered by someone on the admiral's staff. It read:

From Commander Jovian Patrol to CO Pollux.

You will be in readiness for General Efficiency Inspection 1400 SST 14 May 8940 Terrestrial Year. Entire personnel CASTOR will inspect in accordance with Archive Reprint USN-1946-FT-53.

ABERCROMBIE.

"Unless I'm crazy—and I won't admit it," said Beckley slowly, "this says that we will be inspected by the crew of the CASTOR."

"Yes." The captain's eye was gleaming.

"And if that is not joke enough, it goes on to say that they will do it according to some aboriginal practice or other. Shades of Hanno and Nelson! What did they ever do on a trireme that is applicable to us?"

"The principles of warfare change very little through the millennia," remarked Captain Mike, dryly, "and, moreover, your history is a bit foggy, Beckley. The Phoenicians much antedated the Americans. The latter were far more advanced. As a matter of fact, they are credited with the invention of the first spaceship. In any case, our admiralty commission, that has been digging through the records unearthed in the excavations for the fifth sublevel at Washington, has decided that some of their practices were good enough to be reinstated. So there we are."

"Meaning, I take it, that we are to be inspected according to some system invented by John Paul Jones, Sims, Leahy, or some other long-dead old sea dog?" Beckley was thankful he had remembered the names of a few of the early Terrestrials. It was a polite rebuttal of the skipper's comment on his historical knowledge.

"Exactly."

"All right," said the executive officer. "In that case, I will get ready. In fact, we're ready now. You know inspections never gave us any worry."

"We've never been really inspected before," was the captain's grim retort. "Step down to my cabin and I will give you a copy of that reprint."

ORDINARILY, the commander would have greeted the returning ball players with some jolly pleasantry, but although he saw them trooping in, gay and ruddy from their brisk work-out and the bracing showers after it, he said not a word to them. He was deep in the perusal of the antique document exhumed from the vaults below the old city of Washington. The deeper he read, the faster his confidence in the ship's readiness oozed away. At first he had some difficulty with the outmoded terminology, but as he groped his way through it, glimmerings of the immense difficulties before him began to appear.

In the end, he sat in astounded admiration at the ingenuity of a people he had long thoughtlessly regarded as primitive. Small wonder their ships had behaved so well during the great Terminal War of the Twentieth Century. The marvelous stamina they displayed was due to the fact they were prepared—prepared for anything, whether accident, damage in action, or catastrophe of nature. So long as any craft of that age remained afloat, its crew continued to work it and to fight it. And now he had learned why. *They knew their stuff*. The system they followed forced them to. Hence, the admiralty's recent adoption of that system.

Beckley sat through supper very quiet and seemingly morose. He was engaged in appraising himself—Chinnery, Moore, Fraser, and the rest. How good were they, for all the trophies they had won? He remembered wryly, how they won first place in the acceleration contest. He and Chinnery knew that the circuit-breakers were lashed down and every fuse in the ship jumped by heavy copper cable. He and the surgeon knew how heavily the men had been doped with *gravonol*. It had taken four days of special rigging to accomplish that feat. Highly artificial! Bah! It was an empty triumph, now that he thought of it honestly in the light of what he had been reading.

After supper, over the cigars, he attempted to convey to his juniors, some of what he had just learned and what was ahead of them. It was not easy. The POLLUX had for a long time been considered a model ship and it was the conviction of most of her officers and practically all her crew, that she could do anything any other ship could do and do it quicker and more smoothly than any other afloat in the ether.

"So what?" demanded Chinnery, as soon as he learned that for the duration of the tests, Pete Roswell of the CASTOR, would be at his elbow, watching and noting everything he did, and that rating for rating, every man in the black gang would be matched by his opposite number from the sister cruiser. "Let 'em come. Let 'em watch. They'll learn something. Who cares what they see? My uranium consumption, acceleration for acceleration, is the lowest in the whole star-spangled fleet. We haven't had a breakdown of an auxiliary in more than a year, and that's a record for any man's service."

"That is just it," observed Beckley pointedly. "You're *too* good. It makes you cocky and you take too much for granted. What would you do if you did have a breakdown—cut in your reserve generators, I suppose?"

"Sure—always have. They work, too. Both sets."

"And if those went on the blink?"

"Well—there are the selenium units on the hull, only—"

"Quite so. Only there isn't much sun power out here by Jupiter and you haven't run a test on them since we left Venutian Station. But suppose you did hook 'em up and could get a little juice out of them and then *they* went out, what?"

"For the love of—Why, storage batteries, of course."

"*Storage batteries* is good," snapped the exec. "In the last quarterly report, if my memory is correct, they were listed as being in 404D, your space storeroom. How many amps do you think you could pull from there?"

Chinnery lapsed into a glum silence. He had never seen the exec in this mood. Beckley turned to Fraser and asked abruptly:

"What do we do if the intership phone goes out?"

"Shift to telescribes."

"And after that?"

"The annunciator and telegraph system."

"And after that?"

Fraser looked puzzled. "If we lose the juice on the annunciators they can be operated by hand." He shrugged. "After that, if you insist on it, there are always messengers."

"Why not voice tubes?" queried Beckley, cocking an eyebrow.

"Voice tubes?" echoed several. The others laughed. The admiralty *had* gone primitive.

"That is what I said. Believe it or not, gentlemen, but the POLLUX is equipped with a complete system of voice tubes, gas- tight covers, and all. Yet not one of you knows it. You have probably painted them over, or stuffed them with old socks or love letters. Now get out of here, all of you, and inspect your parts of the ship. Come back at midnight and I will tell you more about this inspection and what we have to do to get ready for it."

THE group of officers returned to the wardroom at twelve, not greatly enlightened by their inspection. They knew what the commander was driving at, but most of them felt they already knew the answers. On a warship there are always many alternative ways of doing the same thing, for in the heat of action things go wrong and there is no time for repairs. But most of them were already familiar with what they had to deal with, except Bullard, of course, who was new. He was the only one of them who had the slightest doubt of his readiness for any test that might be put to him.

Cracking jokes, but at the same time slightly mystified by the slant the executive had taken, they assembled. Commander Beckley entered and tossed the reprinted early-American document on the wardroom table. Moore crossed the room and fingered it, noting its title. It was "Chief Umpire's Report, Battle Efficiency Inspection U.S.S. ALASKA, Spring, 1940."

"I have told you we are to be inspected by the CASTOR," began Beckley. "What I didn't tell you is that later on, we inspect them."

"*Whee!*" yelled Fraser. "I've always wanted to know how they puttied up that main condenser. It is nothing short of a miracle how it hangs together."

A look of smug satisfaction flitted across Chinnery's face. In his estimation, Pete Roswell, engineer of the CASTOR, was a stuffed shirt.

Moore was smiling, too, the contented smile of a cat contemplating a canary. Freddy McCaskey, navigator and senior watch of the rival ship, was also his rival for the hand of a certain young lady residing in Ursapolis. His brilliant take- offs and landings in the sky port there had long annoyed Moore, for Moore knew, even if the admiral did not, that they were made possible by certain nonreg gadgets bolted to the underside of the CASTOR's chart rack. They were nonreg for the reason that they were unreliable—they could not be counted upon to stand up under the shock of action. Moore itched to be in a position officially, to expose them, and by doing it burst the bubble of McCaskey's vaunted superiority as a ship handler.

There were others present who had similar designs calculated to upset the peace of mind and complacency of their friendly enemies, judging by the ripple of anticipatory grins that swept the room.

Beckley's eye roved the group, missing the reaction of no one.

"Ah," he breathed, "so that's the way you feel? Well, let me tell you this—so do the Castor Beans. And don't ever forget, they inspect us *first*.

"But don't misunderstand me. There will be no cutthroat competition about this. Friendly rivalry, such as we enjoy with the CASTOR, or outright malice, if it were present, makes very little difference. The men from the CASTOR do not inspect us in the sense of passing judgment; they merely observe and record the data. It is the admiral who does the judging. But you can bet your bottom dollar they won't miss anything. They live and work in a ship the exact twin of ours, and they follow the same routine. They know our weak spots and how we go about covering them up, for they have the same spots and, I daresay, use the same tricks. We might fool the old man, but never a CASTOR Bean.

"As I said before, they will all be here, from Captain Allyn down to the landsman for cook's helper, and every man jack of them will have a stop watch and a notebook. We will be covered, station for station, all over the ship.

"Leaving out the preliminaries, such as looking at the bright work and haircuts and all that sort of thing—which worries none of us—the first thing that happens to us will be the emergency drills. Those are going to be different. The American doctrine was that the real test of an emergency organization is an emergency, and one peculiarity of emergencies is that they come when you least expect them. Moreover, the people on watch at the time are the ones who will have to handle them. That means we cannot hand-pick our best and most experienced men to do the drilling."

"IT will be worked this way. The admiral will ask to see our watch list. He'll run down through the names and pick one at random. It might even be Bullard, here—"

Bullard winced. He did not like that "even," though he was only three days in the ship.

"And he will say, *Send Lieutenant Bullard in.* Bullard will have to relieve the deck. We may cruise along an hour after that, not knowing what is coming, when suddenly the chief umpire will announce, *Fire in the lower magazine*, or *Penetrating collision*, or whatever emergency they have picked. Every CASTOR man starts his stop watch, licks his pencil, and looks at the man he's umpiring. The test will be not only of Bullard, but of the whole organization. As for Bullard, he is in sole charge, and neither Captain Dongan nor I can advise him, and the rest of you can only execute what orders he gives. Whatever he does, whether the right thing, or the wrong thing, or nothing at all, goes down in the notebooks, and also the manner of its execution.

"Let us say the conditions announced are that a small meteorite has penetrated the collision bulkheads and padding and has come into the crew's quarters. We are in ordinary cruising condition—that, is, without spacesuits on. Were our interior gastight doors closed and dogged? If they were not, we lose air throughout the ship. Bullard, no doubt, would order a repair party forward. The CASTOR's repair party will go through the intermediate lock with our party, noting everything. Did the lock work smoothly? What kind of patch did the repair party put on, and how long did it take? Were they skillful or clumsy? How long after that before air was back in the compartment? Did the patch leak? How much elapsed time between the alarm and *secure?*

"You get an idea from that, of how closely we will be supervised. I need not go into all the other emergency drills, or the possible variations on them. The point to engrave in your memories, is that any of you may be called upon to conduct them, and without prior notice. You had better know the answers."

"I think we do," remarked Moore, looking about at the others.

"Those tests are comparatively trifling," pursued Commander Beckley. "It is the battle drills that are apt to give us trouble. There they will spring casualties on us."

"Casualties?"

"Yes—imaginary accidents, failures of equipment, fatalities. In battle, you know, things happen. We bump into mines. Torpedoes hit us, and shells. We overload motors and they burn up. Controls get jammed. People get hurt and drop out of the picture and somebody else has to step into their shoes and carry on. Our

thermoscopes may go dead. A thousand things can go wrong. The big question is, what do we do when they do?

"Captain Allyn and his officers will work out a schedule of such casualties, neatly timed, and shoot them at us, one by one. As they do, they will make it as realistic as possible. If the primary lighting system is declared out of order, they will pull the switches. If the phones go out, they will jerk the connections in Central, and we can't touch them. If gas is reported in some compartment, they will let loose some gas in there. You can expect those casualties to come thick and fast, and you will have to know your switchboards and pipe manifolds from A to Z. It will test your versatility and coolness to the utmost."

"They ought to be able to think up some good ones," drawled Chinnery, and a few of the others laughed. The CASTOR had stripped the blades in her main auxiliary turbine only six months earlier, and she had had a serious switchboard fire during her last battle practice. Not only that, but in a recent take-off, a jet-deflector had jammed and she had spun for more than fifteen minutes about eight miles above Europa City, a gigantic pin wheel, spewing blue fire. That brought her a biting rebuke from the Patrol Force Commander.

"They will," said Beckley, grimly.

There was some laughter, but there was a hint of uneasiness in some of it. Ever since the exec's crack about voice tubes, their complacency had waned. To their surprise, the voice tubes were found to be there. What else was there about the ship they did not know?

"I think that covers it," said Commander Beckley, rising. "That is, all but one feature—human casualties. It appears from this"—and he tapped the Archive Reprint—"that it was considered a rare bit of humor by our lusty ancestors to kill off the skipper early in the game, and they usually followed that promptly with the disposition of the executive officer. In this report, they killed off practically all their officers in the first five minutes, and a great many of the crew with them.

"The moment an umpire declares us dead we cannot utter another word, no matter what happens. Our organization has to carry on without us. That may be a good test, but I fancy it is agonizing to watch. I recommend you put a little more attention into your drills hereafter. But above all, each of you must be prepared on an instant's notice, to succeed to the command of the ship as a whole."

"By the time we get it," observed Kingman, anxiously, "she will be virtually a wreck—riddled with imaginary holes, on fire, lights out, generators dead, controls jammed, two thirds of the crew knocked out and—"

"You get it," grinned Beckley, relaxing for the first time since the captain had interrupted the meteor ball game. "Good night, boys—pleasant dreams!"

"DON'T you worry, Mr. Bullard," said Tobelman, his chief turret captain, after General Quarters the next morning. "There isn't anything in this turret we can't handle, somehow."

But Bullard did worry, for he knew he was green. But he worried with a purpose. Every day of the three weeks that intervened between the exec's warning and the time set for the inspection, he plugged away at learning the ship and its intricate mechanism. By day he crawled through access and escape hatches, tracing cables and conduits; at night he pored over wiring diagrams and pipe

layouts. He learned how to break down and assemble the breech mechanisms of his guns, how to train the turret by hand, and how to load in the dark. He became acquainted with the use of his stand-by thermoscope and practiced for an hour each day on the old Mark XII Plotter installed in his control booth, so as to be able to maintain his own fire should his communication with the CC be cut off.

In like manner he checked his "ready" magazines and found out what he needed to know about their sprinkler systems and smothering-gas ducts. He went on beyond them and made himself familiar with the reserve magazines with their stores of TNT, ammonium nitrate, and bins of powdered aluminum. His *ammonal* he did not mix until needed, a precaution to reduce the fire hazard.

By the end of the second week he had gained a sense of confidence. In his own little department, at least, he knew his way around. And the more he worked with Tomlinson, the more he realized that back of him was a splendid bunch of boys. What he couldn't do, they would. It was in his capacity as officer of the deck that he had the most misgivings. As a watch officer, he took his regular turn in supreme command of the ship, and the more he prowled its recesses the more he was impressed by the magnitude of the task he had set himself—to learn *all* about the ship.

Every cubic yard of her vast bulk contained some machine or electrical device, the use of many of which he had but the vaguest knowledge. The POLLUX was a very different breed of ship than the old ASIA, relic of the Third Martian War and long overdue for the scrap heap.

On the *Asia* he had been chief engineer, and as such, knew every trick of the balky old tub, yet when he would go into the engineering compartments of the POLLUX, he stood humble before its glittering intricacies, almost dazed by the array of strange equipment. They showed him the clustered nest of paraboloid propelling reflectors, together with their cyclotronic exciters. They traced for him the slender tubes that conveyed the pulverized Uranium 235 to the focal disintegrating points, and explained how to operate the liquid hydrogen quenching sprays. Fraser took him through the boiler rooms and sketched out for him the cycle of heat transfer, beginning with the queerly designed atomic power fire boxes, and ending with the condensers outside on the hull. Elsewhere, he examined the mercury vapor turbines and the monstrous generators they drove. In all that vast department there was but one section that struck a familiar chord. And it, he discovered, was kept locked off.

"Oh, that?" sneered Chinnery, when Milliard tapped the sealed door. "A set of old oxy-hydrogen propelling motors. Stand-by, you know. Some dodo in the admiralty drafting room is responsible for that, I guess—supposed to be used when we are *in extremis*."

Chinnery gave a short laugh and turned away, but Bullard was persistent. He wanted to see them and check their fuel leads. At least, he had found something in this ultra-engine room he could understand at a glance.

"I forgot you came from the Crab Fleet," said Chinnery, in mock apology, "but since you ask it, you shall see those noble engines," and Chinnery beckoned to a rocketman, first-class, who stood nearby.

"Show Mr. Bullard the skeleton in our closet," said Chinnery, and departed, his spotless dungarees a mute reproach to Bullard's own grease-smeared overalls.

"I was Crab-Fleet, too," grinned Benton, the rocketman, as he forced the door. "They don't think much on these Star-ships of the old liquid-fuel tubes, but you and I know what they can do. At least, you can count on 'em. These atom busters are O.K. when they work, but they're too temperamental to suit me. But you're the first officer I ever saw in the POLLUX that even wanted to look at them tubes—our oars, Mr. Chinnery calls 'em."

Bullard laughed outright. The Patrol Force was a strange blend of ultramodernism and old customs, a sore of bivalence—where practical men of the old sailorman psychology used every modern gadget and hated it as he used it; and trim, smart scientists applied archaic sea terms to their latest triumphs.

ON another day Bullard let himself into the big nose "blister," and saw for himself, the arrangement by which the impact of stray cosmic gravel and small mines was distributed and absorbed. Beneath the false bow plate of vanadium steel was a roomy forepeak stuffed with steel wool, and scattered irregularly throughout were other loosely connected plates separated by sets of spiral springs. In general, the anti-collision compartment resembled a titanic innerspring mattress laid across the ship's bow. A cosmic lump striking the nose plate could not be prevented from penetrating, but each of the inner bulkheads it pierced gave a little, disturbing the force of the impact and slowing down the celestial missile by a large percentage. Only a massive body moving at relatively high velocity could retain enough velocity to crash through the last bulkhead into the crews' quarters.

Behind the crews' quarters stood the armored bulkhead that shielded the heart of the ship—the colossal triple-gyro stabilizer that formed the nucleus of the egg-shaped spaceship and marked the location of the vessel's center of gravity. It in turn, was supported by a massive steel thrust column, rising directly from the arches that held the propelling motors, and clustered around the thrust column and in the lee of the armored stabilizer housing lay the Central Control Room, Plot, the H.E. magazines, and the more volatile of the chemical stores. Elsewhere in the ship were the various auxiliaries—the air-circulating fans, the renewers, and the garbage converters, and all the rest of the multitudinous motors for every purpose.

Bullard was exhausted, mentally and physically, by the time he had completed the comprehensive survey, but he felt better for having done it. In his journeys he had missed nothing, taking in storerooms as well as machinery spaces, viewing the planetary bombing racks recessed in the landing skids, and the selenium helio-generators on the upper halves of the hull. There were many details he knew he had not fully grasped, but the main thing was he had regained his customary self-confidence. He no longer felt himself a stranger on the ship.

The others had not been idle, either. Intensive drills had been held daily in all departments, and as nearly as was humanly possible, every conceivable contingency had been foreseen and provided for.

"If those CASTOR Beans have thought up just half the stunts I have," observed Kingman, at the end of a strenuous day's preparations, "this inspection is going to be a honey. But what the hell! My conscience don't hurt. If there is anything unprovided for, it's the fault of my lack of imagination—nothing else."

"Yeah," grunted Chinnery. Chinnery had become a trifle touchy over the coming ordeal. The exec had made him clear out the old battery room and reinstall his storage batteries.

"They say," chimed in another, "that Freddie McCaskey is going to make Moore set the ship down on top that spiny ridge at the north end of Io, with two of his underjets out of commission. To make it tough they are going to put an egg on the chart-rack. If it falls off and busts when he hits, the mark will be a swab-o."

"Scuttlebutt, you dope," commented Fraser, "nobody knows what they'll spring on us. But, personally, my money is on the old POLLUX. All that's worrying me is—"

And on and on it went. Speculations was rife in every nook and cranny of the powerful sky cruiser. The lowest rating on board tossed feverishly in his hammock throughout the rest period called "night," trying to imagine what crazy orders might be given him, and what he would do about it when he got them. The Polliwogs were agreed on one thing, though. Come what might, the only visible reaction any umpire would get, would be a cheery "Aye, aye, sir." Deadpan compliance was the password. They swore that under no circumstances would any of them display surprise or dismay.

CAME the momentous day. Clean as a shower-washed sky and burnished and polished until she shone almost painful brilliance, the POLLUX lay proudly in her launching cradle at Ursapolis Yard. To the shrilling of pipes, another vestige of age-old tradition, the spry little admiral clambered aboard, his staff at his heels, for the first stage of the inspection.

His trip through the spotless compartments was swift. Although few details of the interior could have escaped his darting glances, he took no notes, nor did he pause at any place to make comment. It was not until he had completed his tour that he broke his silence.

"She *looks* good," he said, cryptically, to Captain Dongan. Whereupon he trotted off to his quarters in the yard for his lunch, sending back word that he would return in two hours for the remainder of the exercises.

"Cinch!" muttered someone, but the captain wheeled and scowled at him. To the captain's mind, the admiral's serene disregard for the snowy whiteness of the paint work was significant. Plainly, the old man's interest was centered elsewhere, and that could only be on the practical tests. It was not that the captain was especially dubious as to the outcome—he merely wondered. After all, as he had told Berkley, they had never really been inspected before.

Hardly had the admiral left than the Castor Beans began pouring aboard. The enlisted men came first, swarming down the dock and waving their notebooks.

"Hi-ya, Pollutes!" they yelled. "Boy, if you only knew!" Grinning Polliwogs let them aboard and led them off into the recesses of the ship, hoping, while their umpires were in a boastful mood, to worm some of their secrets from them in advance. A little later Captain Allyn and his officers came, and later, at the appointed hour, the admiral.

"Ahem," announced the admiral, his words very crisp, for all his high-pitched, thin voice. "The POLLUX will lay a course past Jupiter to the small, innermost satellite, now in opposition. She will land on it, then take off and return to base.

During the problem, she shall not communicate with nor receive assistance from the outside. At various times, as we go, we shall hold drills, introducing various casualties. It must be understood that these artificial casualties are to be treated in every respect as if they were real, and if the ship departs in any manner from such treatment, the score for the tests shall be zero."

Captain Dongan acknowledged the admiral's instructions with a nod.

"And let me add," went on the admiral, "that should there, by chance, occur any real accident or casualty, it shall be treated as part of the problem. Are you ready, gentlemen?"

CARLSON, the baby of the mess, drew the take-off, and despite a rather obvious self-consciousness, managed it well. The ship drew upward cleanly and smoothly, and gradually curved like a soaring eagle toward the great rose disk of the System's primary. Carlson drew a perfunctory, "Well done," from the chief umpire, and withdrew, mopping his brow in relief. It was Kingman who succeeded him.

"Fire in the paint locker!" was what Kingman had to deal with— the commonest and most obvious of fire drills. People ran to their stations in jig time and were duly checked off. Their performance was faultless, their apparatus was in perfect condition, the most carping critic could find nothing to complain of. A great load rolled off the exec's troubled mind. Fire in the paint locker, indeed! If they kept on springing chestnuts like that, this expedition would be a picnic.

"And think of all the useless work he put us to," crabbed Chinnery into Fraser's ear.

It fell to Fraser's lot to conduct the Abandon Ship Drill. The Polliwogs were tense as televox repeaters throughout the ship chanted the call to the boats. No. 3, on the starboard side, was a balky slut. Five times out of six her tube would not fire unless preheated with a blowtorch. It was a mystery why, for they had successively put in four spares and still No. 3 performed in the same erratic manner. But today she took off like a startled dove at the first touch of the coxswain's button. Pure luck that was, for there was not a chance to use the torch with watchful umpires writing down all they saw.

The CASTOR Beans pawed through the returned boats, looking for error, but their search was unsuccessful. Boat boxes were correct, down to the first aid kit, as was the power installation and the handling. Fraser drew another four-o and was excused.

Bullard was called up and there was a long lull. They were inside Ganymede's orbit before the umpires raised the alarm of collision.

That, too, was expeditiously dealt with, although a penalty of one tenth of a point was assessed because a third-rate carpenter's mate in his haste, entered the air-exhausted compartment before putting his vacuum helmet on. When Bullard heard that that was all that was wrong, he drew a deep breath and relaxed. It was annoying to have sullied the ship's hitherto perfect score with a penalty, but it could well have been worse.

Moore drew the "Search and Rescue Party" and while the ship hove to above Mount Sarpedon in Equatorial Europa, descended into that noisome crater and found and brought back the dummy which an aid of the admiral had planted there

some days before. It was a triumph for the POLLUX, for the dummy was lying smack in the midst of the dreaded Halogen Geysers. Raw fluorine is hard on standard equipment, but the POLLUX's rescue boat carried what it took. Aside from a mild gassing of two members of the boat's crew, there were no mishaps.

The admiral was standing on the boat deck when Moore came back. He stared at the remnants of the corroded dummy and at the pitted helmets and reeking suits of the rescue party. A Castorian umpire stepped out of the boat and reported the two cases of gassing.

"Too nice work to spoil with a penalty," decreed the old man. "Chalk up a four-o for Lieutenant Moore."

That night the mess was jubilant. They were two thirds the way through the inspection and hadn't slipped yet—except for that fractional point against Bullard. No one reproached him for that, for it was not that kind of a mess, but Bullard was none too happy. Had there been other penalties, he would not have minded, but this one stood glaring in its loneliness.

"We're better than you thought, eh?" said Beckley, slapping Abel Warlock, exec of the CASTOR, on the back.

"You're not out of the woods, yet," was Warlock's dry rejoinder, and he threw a wink to Pete Roswell. "Tomorrow's another day."

IO was under the stern and drawing aft when General Quarters was sounded. Men tumbled to their battle stations and manned their weapons. Bullard crawled into his control booth and strapped on his headphone. "Ready," he reported, after an instantaneous check-up of his turret crew. Every man was at his post, poised and ready.

It was a tableau that was repeated all over the ship. Captain Dongan was at Control, the exec in Plot, and on down the line each was where he should be. And beside each was the inevitable umpire with his ticking watch and his telltale notebook. Now was the hour. Here is where the fun began. Were the Polliwogs fair-weather sailors or what?

"Start watches," signaled the chief umpire, and the problem was begun.

At four and a half seconds, Bullard let go his first salvo. Swiftly his men threw in the second load.

The machinery-packed turret was uncomfortably full of men, what with the doubling up due to the presence of the umpires. These latter were dancing about, trying to keep out of the way while at the same time recording the fire-control data as it came in over the visuals, or otherwise making notes of the efforts of the POLLUX men. In the booth with Bullard was Heine Bissel, the turret officer of the CASTOR, keeping one eye on what Bullard was doing and the other peeking at the list of casualties in his hand. Bullard envied the umpires their freedom of movement, for unlike the men at battle stations, there was no necessity for the umpires to dress themselves in space-suits. In battle, of course, suits were donned before its commencement. A chance hit, penetrating an outer bulkhead, might at any instant cause a compartment to lose its air.

Bullard's second salvo went, but coincidentally with it the lights flickered, dimmed a moment, then blazed up again. Somewhere below something had gone

wrong with the primary lighting circuit and there had been a shift made to another.

"Your ammunition hoist motors are inoperative," announced Bissel, looking at his list.

"Hoist by hand!" ordered Bullard, almost in the same breath. He attempted to report the casualty to CC, but the phone was dead on his ears. He snatched its jack from the outlet and plugged in on No. 2 circuit. It was dead.

His men managed to get the guns fired a third time. It was a full three seconds late, due to the delay occasioned by having to serve the guns by hand, but under the circumstances, in good time. Bullard saw them ram the fourth set of projectiles home. His eyes caught the racing words on the telescribe above his head, "Transverse hit penetrated both CC and Plot—captain and executive dead—control now in sub-CC—Chinnery commanding."

"Your lights have gone out," remarked Bissel, with a triumphant gleam in his eye, reaching for the cut-out switch overhead. The lights *were* out.

Bullard kicked out with his left foot and found the emergency battery switch. Again there was light, this time from the turret's own batteries, independent of any general ship's circuit. Tobelman shot the propellant into the breech of the last gun and closed the firing key. There was no recoil. He jerked the lanyard and fired the guns by percussion. At that moment an umpire rose from behind the loading tray and fired a pan of flashlight powder. There was an instant's brilliance, blinding in its intensity. Then all was black.

"Your battery has short-circuited," came the calm voice of Bissel through the murk. There was suppressed amusement in it, and Bullard suspected this last casualty was an improvised one. But it did not matter. Bissel had kicked the turret switch open again, and that made it official.

"Loaded in dark, sir!" called Tobelman. "Ready!"

"Fire!" Bullard was proud of his gang.

"Enemy shell just entered and wiped out turret crew," whispered Bissel. There was silence outside the booth as the men desisted from their efforts in the dark. Each had been told the same thing by his own umpire. Bissel snapped on a portable flash long enough to jot down the time of the massacre.

"Am I dead, too?" inquired Bullard.

"Oh, no. You're all right. Your turret is all shot, that's all."

Bullard dived out of the escape hatch. If all his men were dead, there was nothing to be gained by sitting in the darkened control booth waiting for the end. His duty was elsewhere.

THE elevator was stuck between decks, probably another casualty. Bullard, trailed by the panting Bissel, flung himself down the ladder and dropped through the armored hatchway into CC. It was empty, except for a couple of lounging umpires, comparing notes. Bullard cast an anxious eye at the settings on the main control board, but with it saw that the master switch at the top of it was open. Control, of course, had been shifted elsewhere. The positions, of the controls here, regardless of how they were set, were meaningless.

He dashed down the passage toward sub-CC, a little cubbyhole abaft Plot, not wasting a second in a futile stop at the Plotting Room. What he had seen in CC,

would doubtless, be repeated there. As he passed the door of the wardroom he caught a glimpse of the officers crowded in there, and what he saw made him pause a moment and take a closer look. Peering through the glassite panel he was astonished to see most of the officers of the POLLUX in there, either out of their spacesuits or in the act of taking them off. Chinnery, whom he thought in temporary command, was one of them.

"The corpses," grinned Bissel. "They are where they won't interfere and they may as well be comfortable."

But from the indications, Captain Dongan was anything but comfortable. He was pacing the deck impatiently, grave concern in every line of his rugged face. Beckley looked scarcely less uneasy.

Bullard hurried on. He had seen every one of his brother officers in there except Fraser. Could it be that he and Fraser were the only survivors? He jerked the door of sub-CC open. The place was a madhouse, five men stationed at voice tubes yelling to five other men in some other place—and each of the five communications was a different one.

"Thought you were dead," exclaimed Fraser, seeing Bullard come bursting in. "Everything has gone to pot and communications are terrible, but if you are looking for a job, jump down into the engine room and make a check—"

"Apoplexy!" screamed an excited umpire, pointing at Fraser. "You! You're dead."

Fraser choked his words in the middle, stamped a foot in disgust, and jerked off his helmet. He turned in the doorway and looked as if he was about to say something; then, as if thinking better of it, stalked off toward the wardroom to join the rest of the "dead."

Bullard suddenly realized that he was left in command on the ship, but he had not the faintest idea of her running condition beyond knowing from her heave, that she was still accelerating full power. Until he could learn what had happened and what was left in operating condition, he could give no intelligent orders. Then it was that he saw the admiral, Captain Allyn, Commander Warlock and others watching him intently, through the broad deadlight let into the bulkhead between Plot and the sub-CC. So *he* was to be the goat of this inspection! A sorry trick. He, the next most junior officer on the ship and the latest to join her, put to this severe test! It angered him, but the thought as suddenly struck him that the test was also one of the POLLUX. As long as any man of her complement remained alive, he must carry on. These foxy umpires must be shown that the POLLUX was prepared, and well prepared. The three tedious weeks of intensive drills and the unceasing labors of the captain and his exec in teaching their men must not be in vain. If the ship still could be handled, he would handle it!

"SILENCE!" he roared. The weary talkers at the voice tubes looked at him and blinked. He flung a finger at the first one. "Report!"

One by one, the five told the story, staccato words coming fast. As the details appeared, Bullard was aghast at the task set for him. The torpedo room, like the turret, was out of commission, its crew wiped out. There was a fire raging in the chemical stores locker. The great mercury boilers were shut down, their superheaters riddled and leaking, and as a result, all auxiliary power was off. There was only the weak and inadequate current flowing in from the helio units,

sufficient only to maintain the standing lights. All means of communication was gone except voice tubes. And to cap the climax, the main jets were said to be jammed—full speed ahead. And ahead, perilously close, lay Jupiter—Jupiter the colossal, the huge, the devouring magnet. Drill or no drill, something must be done, and that very soon.

As Bullard sprang into action, he wondered how long the farce of imaginary disabilities would be kept up. Yet until the war game was called off he could touch none of the umpire-guarded valves or switches. He had to work with the disorganized residuum of the mighty ship's power. A new note of danger began to hum, warning him that whatever he was to do could no longer be postponed. Since the automatic controllers on the uranium feed lines were not operating, the acceleration was slowly picking up—when he wanted none at all he was getting more—and there was no way of cutting it off except manually.

He raised the tube room and found to his immense satisfaction that it was Benton, the rocketman, who was in charge there. Benton assured him there was no way to shut off the uranium flow other than by using the forbidden electrically controlled valves.

"Get pipe cutters, then, or Stilsons, and *break* the lines!"

"Aye, aye, sir."

Bullard knew that Benton knew that the uranium would continue to dribble out, wasting into the wake, but unless it was fed to the exact focus of the disintegrating inferno, it could not flare into the tremendous energy of exploding atoms. Once the supply was cut off, the quenching sprays would make short work of the bits still at the focal points.

An insistent call kept coming from the chemical locker, where the fire was supposed to be. The Polliwog there complained that the umpire would declare him burnt to a crisp unless some action was taken to subdue the fire. For a moment, Bullard hesitated. Actually, there was nothing inflammable in the chemical locker—except the fireworks flare the umpires had set themselves to add realism to their act—and consequently the compartment was not fitted with fire-fighting devices.

"Evacuate the storeroom," ordered Bullard. "Gather up all the Pollux men near you and transfer everything in it to the reserve magazine inboard of you."

"Aye, aye, sir," came the voice, relieved from his dilemma of having either to abandon his post or be roasted alive.

Bullard felt the lagging of the vessel as the acceleration ceased and knew that Benton had succeeded in breaking the atomic feed lines. It was a pity to have to waste power in that fashion, but it was unthinkable to continue longer on a power dive into Jupiter. The jet-deflectors were locked rigidly fore and aft and there could be no turning with those jets. He got Benton to the voice tube once more.

"What's wrong with the old rudder flaps over the liquid tube jets?"

"Not a damn thing, sir."

"Then warm up your tubes and let's get going—"

"Aye, aye, sir."

"And, Benton, when they've started spewing, flip 'er halfway around and shoot ninety degrees from the present course. You'll have to do that by local control—there is none for those old tubes in this sub-station."

"Aye, aye, sir."

BULLARD felt better. He was devoutly thankful they had spared Benton for him. Benton was a man of parts. Shortly they would have this wildly careering warship under some degree of control. Then Bullard could proceed with some of the badly needed minor corrections. One thing that was a source of great annoyance was the all-pervading noise, much augmented by the shouts of his voice tube talkers. He decided to abandon the use of the archaic tubes and instead, employ the etherphones in their space helmets. It meant setting up a manifold party line, for the helmet phones were not selective and if everyone should start talking at once the result would be babel.

"Tell all hands," he directed the group of talkers in sub-CC, "to close their face plates and tune in on the etherphone. No one is to speak except in answer to me or to report an exceptional emergency."

The word was passed. Bullard, to check the efficiency of this means of communications, called the various parts of the ship in succession to receive their reports. There were a gratifying number of men still alive and at their posts, despite the wholesale slaughter of the officers. It was not until he checked on the chemical locker fire that he heard anything to disturb him unduly. All was going well until the wild laughter and silly words of the man in charge of the magazine rang in his helmet. Bullard snapped back harsh questions, and for answer got only maudlin ravings, interspersed with outbursts of giggling. The man was drunk—or something.

Bullard glanced sharply in the direction of the admiral and the knot of inspecting officers watching him from Plot. They, too, showed some signs of glee, several of them grinning vacuously. Pete Roswell was executing an awkward burlesque of the *quilliota*, a rather risque version of the time-honored muscle dance often seen in the cabarets of Ursapolis. A sudden anger surged within Bullard. Had they turned the inspection into an outright farce? A bad joke at his expense? As he stared indignantly at the group in Plot, he was further outraged to see Abel Warlock waggishly begin ripping the meter leads from their terminals. And—of all things—the admiral himself, was capering about madly, an absurd elfin smirk spread across his usually ultradignified features.

Again Bullard sharply challenged his man in the magazine. This time the voice that came back was more sober—almost penitent.

"Sorry, sir—had a crazy dream, I guess. But it was awfully funny, sir." As he talked his voice grew even more sober and more contrite. "And sir, I ought to tell you—the umpires have passed out. They're lying around all over the place—"

A funny dream! Umpires dropping unconscious! Bullard lost not a second. With a bound he left sub-CC, headed for the trunk leading down to the magazines.

He fought his way through the smoke of the flares, passed through the half-emptied chemical locker and into the reserve magazine. Dimly he saw his magazine keeper bending over several limp forms on the deck. Bullard paused to examine the smoke bomb but was convinced that it was not the cause of what was wrong. It was a standard product—a mixture of luciferin with a little strontium salts, giving at once, a ruddy flame and considerable quantities of smoke, yet without much heat. Its fumes were neither intoxicating nor hypnotic.

He saw that much of the miscellaneous assortment of chemicals that had been stowed in the locker were now standing about the floor of the magazine, but all of them were ordinary substances and not regarded as hazardous. There were barrels of various salts and carboys of acids, but none of those were broken. On top of the pile stood three roundish flat crystal flasks of nearly black liquid. He recognized them as containers of an iodine solution—also harmless.

Before going to assist his man in reviving the stricken umpires, Bullard opened his face plate by a tiny crack and took a cautious sniff. Ah! That sickly sweetish odor was strangely familiar. And as a queer ringing in his ears began he snapped his helmet shut and fumbled for his oxygen valve. He kept a firm grip on his consciousness; he knew that in a second his momentary giddiness would pass, for the whiff he had had was nothing more noxious than nitrous oxide. But where was the N2O coming from, and how much of it was there?

He sprang to the bin holding the ammonium nitrate. To the eye it was normal, yet his reason told him it must be the source of these fumes. He moved closer to it and was suddenly aware of a warm spot between his shoulder blades. It was as if he had stepped in front of a firebox door. He wheeled to see the source of the heat, and saw—only the three flasks of iodine, and behind and beyond them the lazy smoke of the dying flare.

His bewilderment left him with a rush. The situation was transparently clear. The iodine flasks, shaped as they were, were acting as focusing lenses for the infrared rays from the smudge bomb, concentrating its weak heat until it was plainly perceptible. Under the influence of that mild heating, the ammonium nitrate had begun to break down and give off the nitrous oxide fumes. Now he understood the lunatic behavior of the magazine man before he shut his face plate, and why the umpires were lying unconscious about the place. He flung himself at the iodine lenses and dashed them to the deck. Then he leaped to the atmospheric control valves on the bulkhead and stepped up the amount of oxygen entering the compartment. He called to Benton in the tube room and ordered him to hook up the storage batteries hitherto held in reserve, and put power on the blowers. He must clear the magazine of the "laughing gas."

"LAUGHING gas!" The antics of the inspecting officers! Now it began to make sense. He shot a glance at the open voice tubes and knew in that instant, what had occurred. And knowing it, he shuddered to think of what might be going on above. The nitrous oxide, being heavier than air, was naturally flowing through the open tubes toward the control room and the other compartments clustered about the ship's center of gravity. All those unhelmeted officers, those of the POLLUX as well as the Castorian inspectors, would be tipsy at the very least. Perhaps by now they were dropping unconscious. Bullard snapped shut the gaslight voice tube covers and shouted warnings into his helmet phone to his other men throughout the ship.

"Too late," came back Benton's report. "They're acting like crazy men—but how was I to know? I couldn't smell and I thought it was all part of the game. Only now—"

"Only now what?" snapped Bullard, his heart sinking.

"Well," reported Benton, hesitant to quote so august a personage as the Commander of the Jovian Patrol Force when the latter was in an uninhibited mood, "the admiral came dancing in and slapped our captain on the back and said, *Let's make it a good party*, and Captain Mike said, 'Sure! You've overlooked a lot of bets— '"

Bullard groaned. The stuff must have seeped into the wardroom, too.

"Then they all laughed like hell and began busting things."

Bullard listened dully as Benton recited the list of outrages. Cables had been torn out bodily, others crazily connected and short-circuited; controls were smashed and the needles on gauges twisted to weird angles; in short, they had raised hell generally. The hilarious victims of the gas had made everyone— and more—of the invented casualties a grim reality. Now the ship *was* out of control.

"Keep shooting the oxygen to them," yelled Bullard. "I'm on my way up."

Benton had not overstated the case. The CC, Plot, subplot and the engine spaces suggested the wake of a terrestrial typhoon. The decks were cluttered with controller handles, broken dials and tattered paper. They had even torn up the astragational tables and the log. From the bulkheads dangled the stray ends of leads and bashed-in indicators. The place was an unholy mess. And all about sat the drooping officers who had done it, too groggy by then to do more, but still staring about with imbecilic expressions.

There was no use crying over spilt milk. Outside was the threat of Jupiter, more ominous than before, and Bullard was reminded of it as he felt the thrust when the six old-fashioned liquid-fuel tubes fired their first blast. Good old Benton! Despite the madhouse raging about him, he had persevered with the task assigned and had got them to firing. The ship lurched in reaction and with the lurch many of the dizzy observers were flung to the nearest bulkhead. The busy hospital corpsmen, darting among them with their first aid kits, had a fresh problem to cope with. Some of their patients were doubly unconscious.

Bullard might have been more concerned with the comfort of his stricken seniors, but hard on the heels of the success in getting the tubes to blasting came a new casually, and an utterly unforeseen one. A strange throb shivered through the ship and she began to tilt unaccountably, and with it came a violent side- wise oscillation that made the skin crawl. A still conscious umpire huddled in a corner gave way frankly to his nausea; dangling wreckage battered against the bulkheads while the rubbish strewn about the decks shifted back and forward like the tides of the sea. The din and clatter of it was unbearable.

Above it all rose the shrilling whine of runaway motors. As the wild and sickening oscillations increased in amplitude it became painfully apparent that something was happening to the massive whirling gyros at the heart of the vessel. Bullard fought his way toward them, clinging to such projections his hands could reach and dodging the missiles of debris flung about by the bucking ship. In time, he reached the armored door of the gyro housing and by then he had gained an inkling of what had gone wrong, but the remedy for it was not so obvious.

In their drunken orgy of devastation, the umpires had broken the leads feeding the motor field coils, and the gyros were running away—but at unequal rates, probably due to the inequalities of their own bearing frictions. Bullard knew, of course, that he could cut off the armature current, but if he did that the

acceleration would shortly be reversed. Should the gyros be slowed rapidly, their rotational momentum would be transferred to the ship and force it into a dizzy whirling, a condition the crew could not endure. Bullard had scant hope of being able to restore the field current. Finding the breaks among the tangle of wreckage would take hours, whereas he had only minutes available, and not many of those.

"SEND me a man and plenty of stray cable," he called to Benton, "and I want juice up to the gyro housing from the batteries."

Bullard was looking at the steel columns that held the bearings of the gyro axles—six of them, in pairs, each pair at right angles to the others. What he could not do by electrical resistance he would do by friction. If he could regulate the bearing thrust, he could keep the speed of the gyros under control. It had looked hopeless to him at first, for there was no way to insert the huge jacks they had on board, but he had thought of a way that was at least worth a trial.

"Throw the end of that cable around there," he directed, "and make a coil—a helix—around that bearing column. I intend to magnetize it."

The man—one of Fraser's—did as he was told, but the unbelief in his face was easy to read. What difference did it make whether the thrust columns were magnetic or not?

"That's well!" shouted Bullard, when the last of the six had been wound. Then he ordered current—a weak current, but under his instant control by means of the rheostats he had had inserted in the lines. It had been a tough job, getting that far, for all the while they had been flung this way and that as the whirling masses of metal fought to take charge of the battered cruiser. But Bullard and his helpers had hung on, and now was to come the test.

He was rewarded, after a little, by the halting of the steadily rising crescendo of the motor wail. At least he had stopped the acceleration. Now all he had to do was bring the three into harmony.

"You've got the idea," he said to the principal electrician who had been helping him. "Keep monkeying with them until they are all together. The bearings will get hot, but we can't help that. Flood 'em with oil, and if that don't do it, send down for some liquid air. Whatever you do, don't let 'em freeze, or we'll be flung clear out of the System."

"Aye, aye, sir," said the man, "but how did we do it?"

"Magnetostriction," Bullard explained, as he prepared to slip from the compartment. "A *little* magnetism makes steel expand, that's all. If your bearings get too tight, give 'em either more juice or less, and you'll shorten those columns."

Bullard slid out of the housing and picked his way aft. He wondered where they were by now and whether they would win their fight with Jupiter. He could feel the surge of the ship as the six flaming tubes drove it, and knew from his sense of weight that they were pulling out—but how fast?

BENTON looked worried. His tubes were behaving wonderfully, but they lacked power for the job imposed. The POLLUX was checked in her fall, and that was all. She needed more kick to escape, and Benton did not dare apply it. Bullard came and looked.

"Can't be helped," he muttered, "give 'er the works."

"They'll melt," warned Benton.

"Let 'em," said the youthful acting captain, with grim finality. "We can't be any worse off."

Benton shrugged, and began the doubling of his fuel lines. Others of his men scurried off to storerooms and presently came back, lugging spare injectors. Those, after a few minutes of frenzied work, were coupled with improvised superchargers and inserted into the new fuel into the laboring tubes, the POLLUX's wake bloomed from a mere meteoric streak of ruddy fire to the whitely dazzling fan of a Grade A comet. Her determined masters piled gravity after gravity onto her acceleration, building her up until her men could stand no more, despite copious injections of *gravonol*. Harried hospital corpsmen had been pulled off their work of salvaging the unhappy "dead" and the Castorian umpires long enough to administer those precautionary shots.

Presently a sobered and grave-faced chief umpire—Captain Allyn of the CASTOR—staggered into the tube room, supported by two of his junior officers. All of them looked the worse for wear, bruised and cut as they were and only partially bandaged, but at least they had managed to get onto their feet. Like everyone else, while still woozy from the effects of the gas they had been badly flung about during the bout with the rebellious gyros.

"The admiral says," Captain Allyn announced, "that all imposed casualties are rescinded. Cease present exercises and return to base."

"Like hell he does!" snorted Bullard, flaring with resentment. "You tell the admiral he lacks authority to rescind the casualties *I'm* contending with. You can tell him that I'll get out of here how, when, and if I can: and that it will be time enough after that to talk about ceasing something and returning somewhere. In the meantime, kindly get out of that man's way. He has real work to do."

Captain Allyn opened his one good eye in blank astonishment, but he stepped to one side and let the burdened tube man pass with his armful of fresh spare parts. The skipper of the CASTOR looked from the angry young man in his soiled and torn uniform to the chaotic tube room about him, and then back again. He had not realized what a pass things had come to. There were no instruments of any kind in working order, either astragational or engineering. These sweating, strained-looking men could only guess at the pressures, voltages, amperages and the rest that they were dealing with. Now, if ever, a man had to have the *feel* of a ship—and this one had an awkward feel, a terrible feel. It was the sickening feeling of doom.

"THERE goes the first one," remarked Benton calmly, as the ship shuddered and gave a little jump. They felt, rather than heard, the increased roar outside, and a white-faced man sitting astride the smoking supercharger in No. 4 tube feed-line frantically fought to close the valve beneath him. The first of the overtaxed liners had reached the ultimate temperature—had been volatilized and sneezed out into Jupiter's face. Benton's voice was quiet and the lines about his chin unquavering, but there was anxiety in his eyes.

"Hang on," said Bullard. "We can't ease off now. The others may be tougher. We're going uphill now—if they'll only last half an hour we'll be over the hump."

Captain Allyn and his two aids discreetly withdrew to a corner of the tube room. He was too competent an officer to meddle, now that he had some understanding of the situation, and he could see that this dirty-faced lad knew what he was about. He contented himself with putting a few additional entries into his already crowded notebook.

It was nearly twenty minutes before the next tube collapsed to be hurled into the wake as a cloud of vividly incandescent vapor. That was No. 3, and five minutes later went No. 1—and almost simultaneously with it, No. 6. But the other two held out until they reached the crest, and beyond. The critical point was passed, judging by the feel of things, and the order was on Bullard's lips to cut the blasts by twenty percent when one of the remaining tubes let go, too. That left but one, all the motive power the ship had, and that woefully inadequate, but at least they were moving outward into the clean, dark depths of the ether. Bullard cut its output hastily until it was down to normal, wondering hopefully as he did, whether they were out of the woods yet.

He left the oppressively hot tube room to Benton and his gang and went out into the disordered ship in search of an altiscope. For minutes he struggled through cluttered passages and choked trunks, looking into the now deserted turrets and other fire- control stations for an unsmashed instrument that bore. It was in the topsy-turvy wreckage of the torpedo room he found one, and it was with a sense of almost dread that he put his eyes to it and took a squint at Jupiter. Then his heart leaped with joy and relief, for the great rose disk took up only part of the telescopic field and as he hastily read the graduations along the cross hairs he saw they were out of the worst of its gravitational field. In fact, they must be not far from the orbit of the small satellite that was their destination.

Bullard whirled the altiscope until he brought the tiny iron body into his field of vision, and the moment he sighted it he began barking orders to his men back in the tube room. They must turn now, and with their single good tube and the five frayed and oversized ones, and buck their own forward momentum. The problem had shifted from the desperate need for acceleration to the necessity of checking their flight. To conform to the terms of the admiral's order, they must land on that barren lump of iron.

SOMEHOW they did it. It may have been four hours later, or six, for time had ceased to have meaning, when a haggard and very dirty young lieutenant and the exhausted remnants of his crew staggered out onto the black plain of Jupiter's inmost satellite. They wasted but a moment in staring up at the huge hulk that had brought them there. Outwardly, she was the sleek, powerful cruiser that she had been the day before, however disarranged she might be inside, but they were not concerned with her general appearance. They had come to inspect the damage done to her after hull by the disintegration of the tube liners. Was it irreparable? And what sort of terrain lay beneath the now helpless Pride of the Skies?

For Lieutenant Bullard was not content with merely having escaped the grip of Jupiter. As he understood it, he was in temporary command of the POLLUX; and of the tactical problem aligned only the first leg had been completed. He must get off this rock next and take her back to Ursapolis and set her down in her launching cradle in the yard. Benton shook his head gloomily. There were no more

rabbits in the hat. To sit down on Callisto they would need not one tube but three, and at that, the maneuver was sure to be jerky and full of risk.

It was while these two were in their huddle, talking over ways and means, that the admiral and Captain Dongan found them. Allyn had roused them and told them where to look.

"Well done, Bullard," said Captain Mike. "The admiral has promised you a special commendation. Tell me now the exact condition of the ship and I will relieve you. The first thing the admiral wants is a jury-rigged radio so we can have tugs come out. As soon as that is done you may go and rest. I'll take charge now."

"No, sir," protested Bullard hotly. "I *demand* the right to carry on. They have put us into this mess as a test. Well—the test is not over yet. According to the rules, if we call for help, we lose. We can't—"

"We have not lost," said Captain Mike, quietly. "The problem has been canceled. Unforeseen developments—"

"Yes!" cried Bullard, his voice almost a scream, he was so outraged at the implications, "that's just it—unforeseen developments, and the POLLUX couldn't take it! That is what the sky fleet will be saying and laughing at us in every mess from Pluto to Mercury. If we let 'em call this thing off now, we're all washed up and done as far as being the best ship in the whole—"

Bullard was a bit hysterical and quite unaware of his seeming insubordination. He had been through a lot and his nerves were frayed and jumpy, but for hours now he had concentrated on this dilemma and he was in no mood to be shoved to one side. It was up to him to find a way out—he *must* find a way out, one way or another. Any other solution would be to let the POLLUX down, an admitted failure, and that was unthinkable. After all, what was this unforeseen development that had wrecked them? Nitrous oxide! So what? That was a legitimate hazard. It could have been generated under other and more normal conditions and would have had to have been dealt with. To call off this test now would be simply to take refuge behind an alibi, and a weak one at that. Bullard was the one the umpires had chosen for the guinea pig and he couldn't quit. As he saw it, not only was the reputation of the ship at stake, but his own personal honor.

Hot words poured from him, reckless words—mutinous sounding, but Captain Mike listened, gravely. He looked at this lieutenant of his thoughtfully.

"I like your spirit, Bullard, but that is beside the point. There is no way out now. It is too late. As for your reputation, have no fear—"

"Oh, that's not it, sir—" Bullard was on the verge of tears.

"Let the boy have his way," interposed the admiral. "His stand is the correct one. Personally, I think we're wasting time, but I won't have it said that I denied justice to any man. If he thinks he can pull out of here, let him try it. I will allot you twenty-four more hours to carry on the problem, Bullard, and during that time you will have no interference. Good luck!"

IF Bullard's tears had been close to the surface from rage and anger, the reason a few dribbled down his cheeks now was a different one. His first emotion was jubilation. But in a moment that gave way to a sense of awe as the full implication of what he had assumed made itself apparent to him. He realized that in insisting on carrying this problem to its conclusion he had put both himself and

the POLLUX on the spot. Before, they had at least an out—a plausible and an officially acceptable alibi. If he failed now, the ship failed with him. Remorse smote him. Had his vanity led him to compromise the name of this ship he had become so attached to? It was a sobering thought. Now he knew as he never had before, that he must succeed. Not until the POLLUX was snugged down in the yard could he rid himself of the responsibility.

That thought was all the bracer he needed. As by a miracle, his fatigue dropped away from him, and by a few terse words he managed to convey to Benton and his helpers somethings of the same fiery spirit that animated him. To a man, they knew that excuses would have no value—they must deliver.

It was an interested group of spectators who thronged about the grounded cruiser. By common consent the rules had been relaxed to the extent that the "dead" could look on and converse, provided only they did not interfere. From the deceased Polliwogs came words of cheer—the whole crew was rooting for them, while now and then a CASTOR Bean would relieve himself of some wisecrack at the expense of the toiling repair men. The admiral, for all his magnanimity, was fretful and impatient. He had a dinner date with the Governor of Callisto for the following evening and it annoyed him to think he might not be there. The Castorians, too, were anxious to get back to the yard. They yearned to get aboard their own vessel, for in the last few hours they had learned there was much to do to that fine ship. Her inspection—by the Polliwogs—was set for the following week.

Bullard doggedly disregarded them all. He had opened a cargo hatch along the keelson and from the nether hold his men had dragged five huge cylinders. Using heavy tackles, they ranged them alongside the POLLUX in the wan sunlight of the Jovian System. Farther aft, heavy tripods had been set up and diamond- pointed drills were biting into the native iron of the little satellite. Other men were high up on the sternpost, driving portable reamers into the ragged tunnels of the tube housings. Chinnery and Roswell, chief engineers respectfully of the POLLUX and CASTOR, stood by, watching.

Chinnery evinced no joy at seeing this young officer from the gunnery department making bold with his spare stores, nor did he take pains to conceal his contempt for this latest effort.

"Spare bushings for the old-style tubes," he explained to Roswell. "I forgot I had a set. But they won't do him any good. They're over-sized. We carry 'em because they are too big forgings to pick up anywhere, but it takes a well-equipped yard to put 'em in—they have to be pressed in, you know, to a tight fit."

Roswell nodded. As a rival, he was quite willing to see the job miscarry. Up until then, the POLLUX had parried every one of his devastating casualties. He was hoping they would muff this real one.

But Bullard neither knew nor cared what they were saying. He and Benton were on top one of the huge tubes, manipulating a gigantic pair of calipers. They already knew they were oversize, and their plans for pressing them in were at that very moment in the process of execution. Astern of the ship a group of holes had been drilled into the iron, and now the men had substituted fat taps for the drills. Those who had originally brought the tubes out of the storeroom were back within the ship, rousing out hundreds of fathoms of high tensile chain—carried for the rare emergency of a heavy tow.

The men up in the tubes reported their job completed, but Bullard frowned when he read the finished diameter. It was too little. He wished ardently for a giant lathe so he could take a cut off the massive tubes. But there was no such lathe nearer than Ursapolis. He would have to reduce the outer diameter of the bushings some other way.

He bled air from the ship through outlets on its shady side, and collected the liquefied gas in buckets and doused the tubes with the cold liquid air, but even when they had shrunk to their minimum size, they were still too large. It was a disappointment, for he had little time to spare for the actual work ahead and none at all for experimentation. The tapping of the holes was done, and now men were already setting the heavy eyebolts and reeving the chains through, ready to hold the ship against the thrust of the great hydraulic jack he had placed astern of her. But still the tubes were too fat. If the ram was strong enough to force them in, the chains would part, he must reduce the resistance, but he saw no way to do it now except to heat the tubes, and that he was reluctant to do, for his tank soundings showed he was already dangerously short of fuel. They had expended it lavishly in their escape from Jupiter. There was barely enough liquid hydrogen to get them off the satellite and on their way to port, with a small margin over for the landing.

Benton shook his head when questioned as to possible sources of substitute fuel. All the uranium had been lost overboard when the feed pipes were broken with full pressure still behind the fuel supply. That had been necessary at the time, and it was fruitless to waste regrets on it now.

Bullard sat down and explored the ship mentally, checking off one by one, the contents of the storerooms. There was nothing he could use that did not have some drawback. *Ammonal* there was plenty of, but he had doubts as to its safety. Then, suddenly, the solution hit him.

"Go ahead and set your first tube," he directed; "No. 1. Then send all the men you can spare into the nose blister—break out a couple of tons of that steel wool. That's what we will use."

IT made a pretty blaze, that tube housing stuffed with steel wool saturated in liquid air, and a short one. Under the terrific outpouring of heat, the tube reddened and swelled, and the ready nose of the first of the bushings was jockeyed into the mouth of the tube and the great jack set in motion. Upward it drove, the ship straining against her leashes, but the pad-eyes set in the hard, planetary iron held, and the quivering POLLUX had to receive her bushing. There was no evading the thrust of the ram.

One by one the other bushings were run in and rammed light, and as the surrounding housing cooled, its contraction crushed the liner to as tight a fit as any yard in the Solar System could have achieved with all their fine equipment. Bullard had no misgivings as to their reliability. They would stay in place.

He was an hour ahead of schedule when the last tool was back on board and the warning howlers announced the imminent take-off. The POLLUX spouted flame—old-fashioned flame, such as the Asia still used—then roared upward on her homeward flight.

"Send this, please," the admiral crisply commanded the tired but contented acting captain of the POLLUX. Bullard looked at him in surprise. The radio had

been repaired, but why did he want to send a signal? No one needed a tug now. They would be in in an hour—long before any tug could be warmed up. But he took the signal, since the admiral had offered it, and read. It was addressed to all ships and stations and began, "I have this day inspected the cruiser Pollux and find her ready in all respects for any contingency of the service—"

The first casualty of the trip really to hit Bullard occurred at that point. Something went wrong with his eyes, and for a moment the message in his fingers was just a blur. He saw the words "special commendation," and a mention of a Commander Bullard, and by then he had reached the familiar signature—Abercrombie. He did notice that the ship's score was a flat four-o, and at the moment that was all he cared about. She had made the grade.