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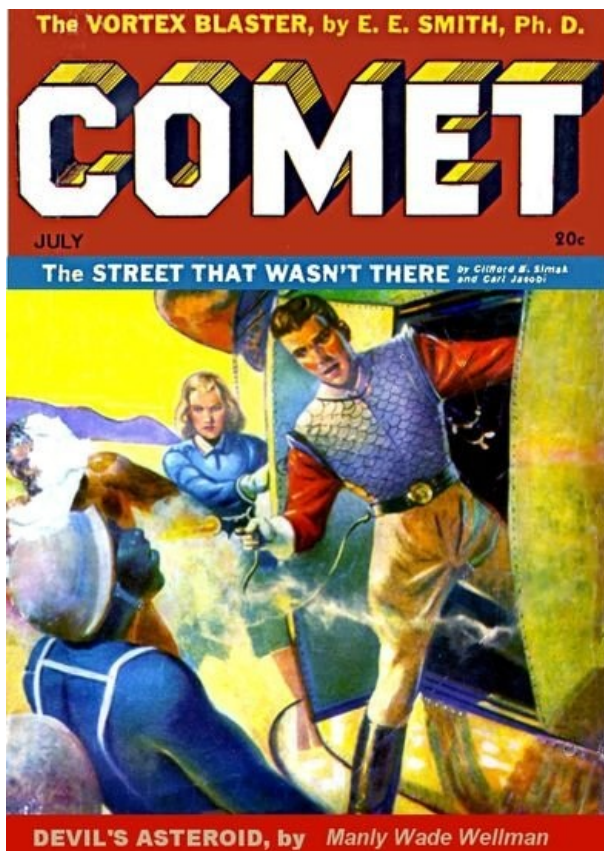
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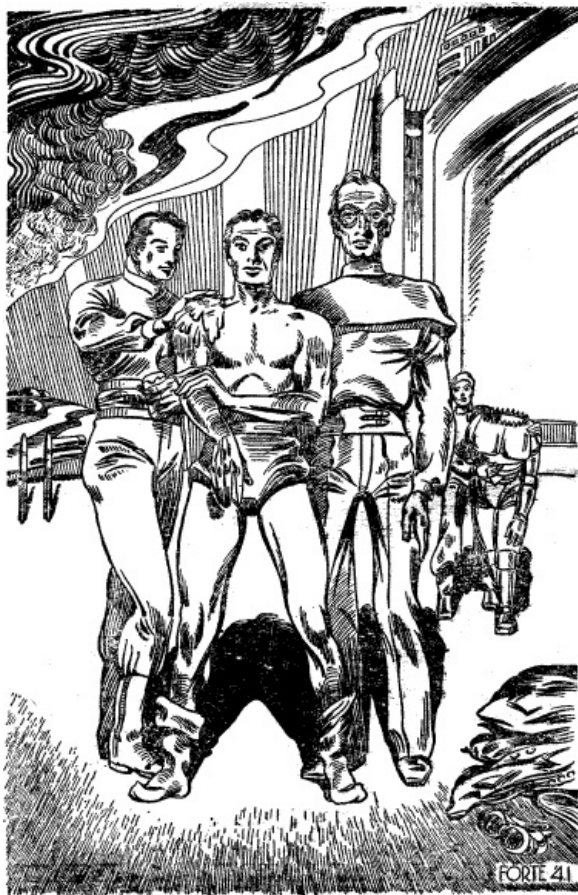
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*** START OF THE PROJECT GUTENBERG EBOOK THE VORTEX BLASTER ***

Comet, July 1941





The Lensman and the observer helped Storm into his heavily padded armor. Their movements were automatic—the ointment, the devices—

INTRODUCING "Storm" Cloud, who, through tragedy, is destined to become the most noted figure in the galaxy—THE

Vortex Blaster

(Complete in this issue!)

by
E. E. SMITH, Ph.D.

Author of "The Skylark," "Skylark Three," "The Skylark of Valeron," the Lensman stories, etc.

Safety devices that do not protect.

The "unsinkable" ships that, before the days of Bergenholm and of atomic and cosmic energy, sank into the waters of the earth.

More particularly, safety devices which, while protecting against one agent of destruction, attract magnet-like another and worse. Such as the armored cable within the walls of a wooden house. It protects the electrical conductors within against accidental external shorts; but, inadequately grounded as it must of necessity be, it may attract and upon occasion has attracted the stupendous force of lightning. Then, fused, volatilized, flaming incandescent throughout the length, breadth, and height of a dwelling, that dwelling's existence thereafter is to be measured in minutes.

Specifically, four lightning rods. The lightning rods protecting the chromium, glass, and plastic home of Neal Cloud. Those rods were adequately grounded, grounded with copper-silver cables the bigness of a strong man's arm; for Neal Cloud, atomic physicist, knew his lightning and he was taking no chances whatever with the safety of his lovely wife and their three wonderful kids.

He did not know, he did not even suspect, that under certain conditions of atmospheric potential and of ground-magnetic stress his perfectly designed lightning-rod system would become a super-powerful magnet for flying vortices of atomic disintegration.

And now Neal Cloud, atomic physicist, sat at his desk in a strained, dull apathy. His face was a yellowish-gray white, his tendoned hands gripped rigidly the arms of his chair. His eyes, hard and lifeless, stared unseeingly past the small, three-dimensional block portrait of all that had made life worth living.

For his guardian against lightning had been a vortex-magnet at the moment when a luckless wight had attempted to abate the nuisance of a "loose" atomic vortex. That wight died, of course—they almost always do—and the vortex, instead of being destroyed, was simply broken up into an indefinite number of widely-scattered new vortices. And one of these bits of furious, uncontrolled energy, resembling more nearly a handful of material rived from a sun than anything else with which ordinary man is familiar, darted toward and crashed downward to earth through Neal Cloud's new house.

That home did not burn; it simply exploded. Nothing of it, in it, or around it stood a chance, for in a fractional second of time the place where it had been was a crater of seething, boiling lava—a crater which filled the atmosphere to a height of miles with poisonous vapors; which flooded all circumambient space with lethal radiations.

Cosmically, the whole thing was infinitesimal. Ever since man learned how to liberate intra-atomic energy, the vortices of disintegration had been breaking out of control. Such accidents had been happening, were happening, and would continue indefinitely to happen. More than one world, perhaps, had been or would be consumed to the last gram by such loose atomic vortices. What of that? Of what real importance are a few grains of sand to an ocean beach five thousand miles long, a hundred miles wide, and ten miles deep?

And even to that individual grain of sand called "Earth"—or, in modern parlance, "Sol Three," or "Tellus of Sol", or simply "Tellus"—the affair was of negligible importance. One man had died; but, in dying, he had added one more page to the thick bulk of negative results already on file. That Mrs. Cloud and her children had perished was merely unfortunate. The vortex itself was not yet a real threat to Tellus. It was a "new" one, and thus it would be a long time before it would become other than a local menace. And well before that could happen—before even the oldest of Tellus' loose vortices had eaten away much of her mass or poisoned much of her atmosphere, her scientists would have solved the problem. It was unthinkable that Tellus, the point of origin and the very center of Galactic Civilization, should cease to exist.

But to Neal Cloud the accident was the ultimate catastrophe. His personal universe had crashed in ruins; what was left was not worth picking up. He and Jo had been married for almost twenty years and the bonds between them had grown stronger, deeper, truer with every passing day. And the kids.... It *couldn't* have happened ... fate COULDN'T do this to him ... but it had ... it could. Gone ... gone ... GONE....

And to Neal Cloud, atomic physicist, sitting there at his desk in torn, despairing abstraction, with black maggots of thought gnawing holes in his brain, the catastrophe was doubly galling because of its cruel irony. For he was second from the top in the Atomic Research Laboratory; his life's work had been a search for a means of extinguishment of exactly such loose vortices as had destroyed his all.

His eyes focussed vaguely upon the portrait. Clear, honest gray eyes ... lines of character and of humor ... sweetly curved lips, ready to smile or to kiss....

He wrenched his eyes away and scribbled briefly upon a sheet of paper. Then, getting up stiffly, he took the portrait and moved woodenly across the room to a furnace. As though enshrining it he placed the plastic block upon a refractory between the electrodes and threw a switch. After the flaming arc had done its work he turned and handed the paper to a tall man, dressed in plain gray leather, who had been watching him with quiet, understanding eyes. Significant enough to the initiated of the importance of this laboratory is the fact that it was headed by an Unattached Lensman.

"As of now, Phil, if it's QX with you."

The Gray Lensman took the document, glanced at it, and slowly, meticulously, tore it into sixteen equal pieces.

"Uh, uh, Storm," he denied, gently. "Not a resignation. Leave of absence, yes—indefinite—but not a resignation."

"Why?" It was scarcely a question; Cloud's voice was level, uninflected. "I won't be worth the paper I'd waste."

"Now, no," the Lensman conceded, "but the future's another matter. I haven't said anything so far, because to anyone who knew you and Jo as I knew you it was abundantly clear that nothing could be said." Two hands gripped and held. "For the future, though, four words were uttered long ago, that have never been improved upon. "This, too, shall pass."

"You think so?"

"I don't think so, Storm—I know so. I've been around a long time. You are too good a man, and the world has too much use for you, for you to go down permanently out of control. You've got a place in the world, and you'll be back—" A thought struck the Lensman, and he went on in an altered tone. "You wouldn't—but of course you wouldn't—you couldn't."

"I don't think so. No, I won't—that never was any kind of a solution to any problem."

Nor was it. Until that moment, suicide had not entered Cloud's mind, and he rejected it instantly. His kind of man did not take the easy way out.

After a brief farewell Cloud made his way to an elevator and was whisked down to the garage. Into his big blue DeKhotinsky Sixteen Special and away.

Through traffic so heavy that front-, rear-, and side-bumpers almost touched he drove with his wonted cool skill; even though, consciously, he did not know that the other cars were there. He slowed, turned, stopped, "gave her the oof," all in correct response to flashing signals in all shapes and colors—purely automatically. Consciously, he did not know where he was going, nor care. If he thought at all, his numbed brain was simply trying to run away from its own bitter

imaging—which, if he had thought at all, he would have known to be a hopeless task. But he did not think; he simply acted, dumbly, miserably. His eyes saw, optically; his body reacted, mechanically; his thinking brain was completely in abeyance.

Into a one-way skyway he rocketed, along it over the suburbs and into the transcontinental super-highway. Edging inward, lane after lane, he reached the "unlimited" way—unlimited, that is, except for being limited to cars of not less than seven hundred horsepower, in perfect mechanical condition, driven by registered, tested drivers at speeds not less than one hundred and twenty-five miles an hour—flashed his registry number at the control station, and shoved his right foot down to the floor.

Now everyone knows that an ordinary DeKhotinsky Sporter will do a hundred and forty honestly-measured miles in one honestly measured hour; but very few ordinary drivers have ever found out how fast one of those brutal big souped-up Sixteens can wheel. They simply haven't got what it takes to open one up.

"Storm" Cloud found out that day. He held that two-and-a-half-ton Juggernaut on the road, wide open, for two solid hours. But it didn't help. Drive as he would, he could not outrun that which rode with him. Beside him and within him and behind him. For Jo was there. Jo and the kids, but mostly Jo. It was Jo's car as much as it was his. "Babe, the big blue ox," was Jo's pet name for it; because, like Paul Bunyan's fabulous beast, it was pretty nearly six feet between the eyes. Everything they had ever had was that way. She was in the seat beside him. Every dear, every sweet, every luscious, lovely memory of her was there ... and behind him, just out of eye-corner visibility, were the three kids. And a whole lifetime of this loomed ahead—a vista of emptiness more vacuous far than the emptiest reaches of intergalactic space. Damnation! He couldn't stand much more of—

High over the roadway, far ahead, a brilliant octagon flared red. That meant "STOP!" in any language. Cloud eased up his accelerator, eased down his mighty brakes. He pulled up at the control station and a trimly-uniformed officer made a gesture.

"Sorry, sir," the policeman said, "but you'll have to detour here. There's a loose atomic vortex beside the road up ahead

"Oh! It's Dr. Cloud!" Recognition flashed into the guard's eyes. "I didn't recognize you at first. You can go ahead, of course. It'll be two or three miles before you'll have to put on your armor; you'll know when better than anyone can tell you. They didn't tell us they were going to send for *you*. It's just a little new one, and the dope we got was that they were going to shove it off into the canyon with pressure."

"They didn't send for me." Cloud tried to smile. "I'm just driving around—haven't my armor along, even. So I guess I might as well go back."

He turned the Special around. A loose vortex—new. There might be a hundred of them, scattered over a radius of two hundred miles. Sisters of the one that had murdered his family—the hellish spawn of that accursed Number Eleven vortex that that damnably incompetent bungling ass had tried to blow up.... Into his mind there leaped a picture, wire-sharp, of Number Eleven as he had last seen it, and simultaneously an idea hit him like a blow from a fist.

He thought. *Really* thought, now; cogently, intensely, clearly. If he could do it ... could actually blow out the atomic flame of an atomic vortex ... not exactly revenge, but.... By Klono's brazen bowels, it would work—it'd *have* to work—he'd *make* it work! And grimly, quietly, but alive in every fiber now, he drove back toward the city practically as fast as he had come away.

If the Lensman was surprised at Cloud's sudden reappearance in the laboratory he did not show it. Nor did he offer any comment as his erstwhile first assistant went to various lockers and cupboards, assembling meters, coils, tubes, armor, and other paraphernalia and apparatus.

"Guess that's all I'll need, Chief," Cloud remarked, finally. "Here's a blank check. If some of this stuff shouldn't happen to be in usable condition when I get done with it, fill it out to suit, will you?"

"No," and the Lensman tore up the check just as he had torn up the resignation. "If you want the stuff for legitimate purposes, you're on Patrol business and it is the Patrol's risk. If, on the other hand, you think that you're going to try to snuff a vortex, the stuff stays here. That's final, Storm."

"You're right—and wrong, Phil," Cloud stated, not at all sheepishly. "I'm going to blow out Number One vortex with duodec, yes—but I'm *really* going to blow it out, not merely make a stab at it as an excuse for suicide, as you think."

"How?" The big Lensman's query was skepticism incarnate. "It can't be done, except by an almost impossibly fortuitous accident. You yourself have been the most bitterly opposed of us all to these suicidal attempts."

"I know it—I didn't have the solution myself until a few hours ago—it hit me all at once. Funny I never thought of it before; it's been right in sight all the time."

"That's the way with most problems," the Chief admitted. "Plain enough after you see the key equation. Well, I'm perfectly willing to be convinced, but I warn you that I'll take a lot of convincing—and someone else will do the work, not you."

"When I get done you'll see why I'll pretty nearly have to do it myself. But to convince you, exactly what is the knot?"

"Variability," snapped the older man. "To be effective, the charge of explosive at the moment of impact must match, within very close limits, the activity of the vortex itself. Too small a charge scatters it around, in vortices which, while

much smaller than the original, are still large enough to be self-sustaining. Too large a charge simply rekindles the original vortex—still larger—in its original crater. And the activity that must be matched varies so tremendously, in magnitude, maxima, and minima, and the cycle is so erratic—ranging from seconds to hours without discoverable rhyme or reason—that all attempts to do so at any predetermined instant have failed completely. Why, even Kinnison and Cardynge and the Conference of Scientists couldn't solve it, any more than they could work out a tractor beam that could be used as a tow-line on one."

"Not exactly," Cloud demurred. "They found that it could be forecast, for a few seconds at least—length of time directly proportional to the length of the cycle in question—by an extension of the calculus of warped surfaces."

"Humph!" the Lensman snorted. "So what? What good is a ten-second forecast when it takes a calculating machine an hour to solve the equations.... Oh!" He broke off, staring.

"Oh," he repeated, slowly, "I forgot that you're a lightning calculator—a mathematical prodigy from the day you were born—who never has to use a calculating machine even to compute an orbit.... But there are other things."

"I'll say there are; plenty of them. I'd thought of the calculator angle before, of course, but there was a worse thing than variability to contend with...."

"What?" the Lensman demanded.

"Fear," Cloud replied, crisply. "At the thought of a hand-to-hand battle with a vortex my brain froze solid. Fear—the sheer, stark, natural human fear of death, that robs a man of the fine edge of control and brings on the very death that he is trying so hard to avoid. That's what had me stopped."

"Right ... you may be right," the Lensman pondered, his fingers drumming quietly upon his desk. "And you are not afraid of death—now—even subconsciously. But tell me, Storm, please, that you won't invite it."

"I will not invite it, sir, now that I've got a job to do. But that's as far as I'll go in promising. I won't make any superhuman effort to avoid it. I'll take all due precautions, for the sake of the job, but if it gets me, what the hell? The quicker it does, the better—the sooner I'll be with Jo."

"You believe that?"

"Implicitly."

"The vortices are as good as gone, then. They haven't got any more chance than Boskone has of licking the Patrol."

"I'm afraid so," almost glumly. "The only way for it to get me is for me to make a mistake, and I don't feel any coming on."

"But what's your angle?" the Lensman asked, interest lighting his eyes. "You can't use the customary attack; your time will be too short."

"Like this," and, taking down a sheet of drafting paper, Cloud sketched rapidly. "This is the crater, here, with the vortex at the bottom, there. From the observers' instruments or from a shielded set-up of my own I get my data on mass, emission, maxima, minima, and so on. Then I have them make me three duodec bombs—one on the mark of the activity I'm figuring on shooting at, and one each five percent over and under that figure—cased in neocarballoy of exactly the computed thickness to last until it gets to the center of the vortex. Then I take off in a flying suit, armored and shielded, say about here...."

"If you take off at all, you'll take off in a suit, inside a one-man flitter," the Lensman interrupted. "Too many instruments for a suit, to say nothing of bombs, and you'll need more screen than a suit can deliver. We can adapt a flitter for bomb-throwing easily enough."

"QX; that would be better, of course. In that case, I set my flitter into a projectile trajectory like this, whose objective is the center of the vortex, there. See? Ten seconds or so away, at about this point, I take my instantaneous readings, solve the equations at that particular warped surface for some certain zero time...."

"But suppose that the cycle won't give you a ten-second solution?"

"Then I'll swing around and try again until a long cycle *does* show up."

"QX. It will, sometime."

"Sure. Then, having everything set for zero time, and assuming that the activity is somewhere near my postulated value...."

"Assume that it isn't—it probably won't be," the Chief grunted.

"I accelerate or decelerate—"

"Solving new equations all the while?"

"Sure—don't interrupt so—until at zero time the activity, extrapolated to zero time, matches one of my bombs. I cut that bomb loose, shoot myself off in a sharp curve, and Z-W-E-E-E-T—POWIE! She's out!" With an expressive, sweeping gesture.

"You hope," the Lensman was frankly dubious. "And there you are, right in the middle of that explosion, with two

duodec bombs outside your armor—or just inside your flitter."

"Oh, no. I've shot them away several seconds ago, so that they explode somewhere else, nowhere near me."

"I hope. But do you realize just how busy a man you are going to be during those ten or twelve seconds?"

"Fully." Cloud's face grew somber. "But I will be in full control. I won't be afraid of anything that can happen—*anything*. And," he went on, under his breath, "that's the hell of it."

"QX," the Lensman admitted finally, "you can go. There are a lot of things you haven't mentioned, but you'll probably be able to work them out as you go along. I think I'll go out and work with the boys in the lookout station while you're doing your stuff. When are you figuring on starting?"

"How long will it take to get the flitter ready?"

"A couple of days. Say we meet you there Saturday morning?"

"Saturday the tenth, at eight o'clock. I'll be there."

And again Neal Cloud and Babe, the big blue ox, hit the road. And as he rolled the physicist mulled over in his mind the assignment to which he had set himself.

Like fire, only worse, intra-atomic energy was a good servant, but a terrible master. Man had liberated it before he could really control it. In fact, control was not yet, and perhaps never would be, perfect. Up to a certain size and activity, yes. They, the millions upon millions of self-limiting ones, were the servants. They could be handled, fenced in, controlled; indeed, if they were not kept under an exciting bombardment and very carefully fed, they would go out. But at long intervals, for some one of a dozen reasons—science knew *so* little, fundamentally, of the true inwardness of the intra-atomic reactions—one of these small, tame, self-limiting vortices flared, nova-like, into a large, wild, self-sustaining one. It ceased being a servant then, and became a master. Such flare-ups occurred, perhaps, only once or twice in a century on Earth; the trouble was that they were so utterly, damnably *permanent*. They never went out. And no data were ever secured: for every living thing in the vicinity of a flare-up died; every instrument and every other solid thing within a radius of a hundred feet melted down into the reeking, boiling slag of its crater.

Fortunately, the rate of growth was slow—as slow, almost, as it was persistent—otherwise Civilization would scarcely have had a planet left. And unless something could be done about loose vortices before too many years, the consequences would be really serious. That was why his laboratory had been established in the first place.

Nothing much had been accomplished so far. The tractor beam that would take hold of them had never been designed. Nothing material was of any use; it melted. Pressors worked, after a fashion: it was by the use of these beams that they shoved the vortices around, off into the waste places—unless it proved cheaper to allow the places where they had come into being to remain waste places. A few, through sheer luck, had been blown into self-limiting bits by duodec. Duodecaplylatomate, the most powerful, the most frightfully detonant explosive ever invented upon all the known planets of the First Galaxy. But duodec had taken an awful toll of life. Also, since it usually scattered a vortex instead of extinguishing it, duodec had actually caused far more damage than it had cured.

No end of fantastic schemes had been proposed, of course; of varying degrees of fantasy. Some of them sounded almost practical. Some of them had been tried; some of them were still being tried. Some, such as the perennially-appearing one of building a huge hemispherical hull in the ground under and around the vortex, installing an inertialess drive, and shooting the whole neighborhood out into space, were perhaps feasible from an engineering standpoint. They were, however, potentially so capable of making things worse that they would not be tried save as last-ditch measures. In short, the control of loose vortices was very much an unsolved problem.

Number One vortex, the oldest and worst upon Tellus, had been pushed out into the Badlands; and there, at eight o'clock on the tenth, Cloud started to work upon it.

The "lookout station," instead of being some such ramshackle structure as might have been deduced from the Lensman's casual terminology, was in fact a fully-equipped observatory. Its staff was not large—eight men worked in three staggered eight-hour shifts of two men each—but the instruments! To develop them had required hundreds of man-years of time and near-miracles of research, not the least of the problems having been that of developing shielded conductors capable of carrying truly through five-ply screens of force the converted impulses of the very radiations against which those screens were most effective. For the observatory, and the one long approach to it as well, had to be screened heavily; without such protection no life could exist there.

This problem and many others had been solved, however, and there the instruments were. Every phase and factor of the vortex's existence and activity were measured and recorded continuously, throughout every minute of every day of every year. And all of these records were summed up, integrated, into the "Sigma" curve. This curve, while only an incredibly and senselessly tortuous line to the layman's eye, was a veritable mine of information to the initiate.

Cloud glanced along the Sigma curve of the previous forty-eight hours and scowled, for one jagged peak, scarcely an hour old, actually punched through the top line of the chart.

"Bad, huh, Frank?" he grunted.

"Plenty bad, Storm, and getting worse," the observer assented. "I wouldn't wonder if Carlowitz were right, after all—if she ain't getting ready to blow her top I'm a Zabriskan fontema's maiden aunt."

"No periodicity—no equation, of course." It was a statement, not a question. The Lensman ignored as completely as did the observer, if not as flippantly, the distinct possibility that at any moment the observatory and all that it contained might be resolved into their component atoms.

"None whatever," came flatly from Cloud. He did not need to spend hours at a calculating machine; at one glance he *knew*, without knowing how he knew, that no equation could be made to fit even the weighted-average locus of that wildly-shifting Sigma curve. "But most of the cycles cut this ordinate here—seven fifty-one—so I'll take that for my value. That means nine point nine oh six kilograms of duodec basic charge, with one five percent over and one five percent under that for alternates. Neocarballoy casing, fifty-three millimeters on the basic, others in proportion. On the wire?"

"It went out as you said it," the observer reported. "They'll have 'em here in fifteen minutes."

"QX—I'll get dressed, then."

The Lensman and the observer helped him into his cumbersome, heavily-padded armor. They checked his instruments, making sure that the protective devices of the suit were functioning at full efficiency. Then all three went out to the flitter. A tiny speedster, really; a torpedo bearing the stubby wings and the ludicrous tail-surfaces, the multifarious driving-, braking-, side-, top-, and under-jets so characteristic of the tricky, cranky, but ultra-maneuverable breed. But this one had something that the ordinary speedster or flitter did not carry; spaced around the needle beak there yawned the open muzzles of a triplex bomb-thrower.



Ten seconds in which to solve the equation—to choose, fire, move clear—the flitter bucked.

More checking. The Lensman and the armored Cloud both knew that every one of the dozens of instruments upon the flitter's special board was right to the hair; nevertheless each one was compared with the master-instrument of the observatory.

The bombs arrived and were loaded in; and Cloud, with a casually-waved salute, stepped into the tiny operating compartment. The massive door—flitters have no airlocks, as the whole midsection is scarcely bigger than an airlock would have to be—rammed shut upon its fiber gaskets, the heavy toggles drove home. A cushioned form closed in upon the pilot, leaving only his arms and lower legs free.

Then, making sure that his two companions had ducked for cover, Cloud shot his flitter into the air and toward the seething inferno which was Loose Atomic Vortex Number One. For it was seething, no fooling; and it was an inferno. The crater was a ragged, jagged hole a full mile from lip to lip and perhaps a quarter of that in depth. It was not, however, a perfect cone, for the floor, being largely incandescently molten, was practically level except for a depression at the center, where the actual vortex lay. The walls of the pit were steeply, unstably irregular, varying in pitch and shape with the hardness and refractoriness of the strata composing them. Now a section would glare into an unbearably blinding white puffing away in sparkling vapor. Again, cooled by an intrushing blast of air, it would subside into an angry scarlet, its surface crawling in a sluggish flow of lava. Occasionally a part of the wall might even go black, into pock-marked scoriae or into brilliant planes of obsidian.

For always, somewhere, there was an enormous volume of air pouring into that crater. It rushed in as ordinary air. It came out, however, in a ragingly-uprushing pillar, as—as something else. No one knew—or knows yet, for that matter—exactly what a loose vortex does to the molecules and atoms of air. In fact, due to the extreme variability already referred to, it probably does not do the same thing for more than an instant at a time.

That there is little actual combustion is certain; that is, except for the forced combination of nitrogen, argon, xenon, and krypton with oxygen. There is, however, consumption: plenty of consumption. And what that incredibly intense bombardment impinges up is ... is altered. Profoundly and obscuredly altered, so that the atmosphere emitted from the crater is quite definitely no longer air as we know it. It may be corrosive, it may be poisonous in one or another of a hundred fashions, it may be merely new and different; but it is no longer the air which we human beings are used to breathing. And it is this fact, rather than the destruction of the planet itself, which would end the possibility of life upon

It is difficult indeed to describe the appearance of a loose atomic vortex to those who have never seen one; and, fortunately, most people never have. And practically all of its frightful radiation lies in those octaves of the spectrum which are invisible to the human eye. Suffice it to say, then, that it had an average effective surface temperature of about fifteen thousand degrees absolute—two and one-half times as hot as the sun of Tellus—and that it was radiating every frequency possible to that incomprehensible temperature, and let it go at that.

And Neal Cloud, scurrying in his flitter through that murky, radiation-riddled atmosphere, setting up equations from the readings of his various meters and gauges and solving those equations almost instantaneously in his mathematical-prodigy's mind, sat appalled. For the activity level was, and even in its lowest dips remained, far above the level he had selected. His skin began to prickle and to burn. His eyes began to smart and to ache. He knew what those symptoms meant; even the flitter's powerful screens were not stopping all the radiation; even his suit-screens and his special goggles were not stopping what leaked through. But he wouldn't quit yet; the activity might—probably would—take a nose-dive any instant. If it did, he'd have to be ready. On the other hand, it might blow up at any instant, too.

There were two schools of mathematical thought upon that point. One held that the vortex, without any essential change in its physical condition or nature, would keep on growing bigger. Indefinitely, until, uniting with the other vortices of the planet, it had converted the entire mass of the world into energy.

The second school, of which the forementioned Carlowitz was the loudest voice, taught that at a certain stage of development the internal energy of the vortex would become so great that generation-radiation equilibrium could not be maintained. This would, of course, result in an explosion; the nature and consequences of which this Carlowitz was wont to dwell upon in ghoulishly mathematical glee. Neither school, however, could prove its point—or, rather, each school proved its point, by means of unimpeachable mathematics—and each hated and derided the other, loudly and heatedly.

And now Cloud, as he studied through his almost opaque defenses that indescribably ravaging fireball, that esuriently rapacious monstrosity which might very well have come from the deepest pit of the hottest hell of mythology, felt strongly inclined to agree with Carlowitz. It didn't seem possible that anything *could* get any worse than that without exploding. And such an explosion, he felt sure, would certainly blow everything for miles around into the smithiest kind of smithereens.

The activity of the vortex stayed high, 'way too high. The tiny control room of the flitter grew hotter and hotter. His skin burned and his eyes ached worse. He touched a communicator stud and spoke.

"Phil? Better get me three more bombs. Like these, except up around...."

"I don't check you. If you do that, it's apt to drop to a minimum and stay there," the Lensman reminded him. "It's completely unpredictable, you know."

"It may, at that ... so I'll have to forget the five percent margin and hit it on the nose or not at all. Order me up two more, then—one at half of what I've got here, the other double it," and he reeled off the figures for the charge and the casing of the explosive. "You might break out a jar of burn-dressing, too. Some fairly hot stuff is leaking through."

"We'll do that. Come down, fast!"

Cloud landed. He stripped to the skin and the observer smeared his every square inch of epidermis with the thick, gooey stuff that was not only a highly efficient screen against radiation, but also a sovereign remedy for new radiation burns. He exchanged his goggles for a thicker, darker, heavier pair. The two bombs arrived and were substituted for two of the original load.

"I thought of something while I was up there," Cloud informed the observers then. "Twenty kilograms of duodec is nobody's firecracker, but it may be the least of what's going to go off. Have you got any idea of what's going to become of the energy inside that vortex when I blow it out?"

"Can't say that I have." The Lensman frowned in thought. "No data."

"Neither have I. But I'd say that you better go back to the new station—the one you were going to move to if it kept on getting worse."

"But the instruments...." the Lensman was thinking, not of the instruments themselves, which were valueless in comparison with life, but of the records those instruments would make. Those records were priceless.

"I'll have everything on the tapes in the flitter," Cloud reminded.

"But suppose...."

"That the flitter stops one, too—or doesn't stop it, rather? In that case, your back station won't be there, either, so it won't make any difference." How mistaken Cloud was!

"QX," the Chief decided. "We'll leave when you do—just in case."

Again in air, Cloud found that the activity, while still high, was not too high, but that it was fluctuating too rapidly. He could not get even five seconds of trustworthy prediction, to say nothing of ten. So he waited, as close as he dared remain to that horrible center of disintegration.

The flitter hung poised in air, motionless, upon softly hissing under-jets. Cloud knew to a fraction his height above the ground. He knew to a fraction his distance from the vortex. He knew with equal certainty the density of the atmosphere and the exact velocity and direction of the wind. Hence, since he could also read closely enough the momentary variations in the cyclonic storms within the crater, he could compute very easily the course and velocity necessary to land the bomb in the exact center of the vortex at any given instant of time. The hard part—the thing that no one had as yet succeeded in doing—was to predict, for a time far enough ahead to be of any use, a useably close approximation to the vortex's quantitative activity. For, as has been said, he had to over-blast, rather than under-, if he could not hit it "on the nose:" to under-blast would scatter it all over the state.

Therefore Cloud concentrated upon the dials and gauges before him; concentrated with every fiber of his being and every cell of his brain.

Suddenly, almost imperceptibly, the Sigma curve gave signs of flattening out. In that instant Cloud's mind pounced. Simultaneous equations: nine of them, involving nine unknowns. An integration in four dimensions. No matter—Cloud did not solve them laboriously, one factor at a time. Without knowing how he had arrived at it, he knew the answer; just as the Posenian or the Rigellian is able to perceive every separate component particle of an opaque, three-dimensional solid, but without being able to explain to anyone how his sense of perception works. It just *is*, that's all.

Anyway, by virtue of whatever sense or ability it is which makes a mathematical prodigy what he is, Cloud knew that in exactly eight and three-tenths seconds from that observed instant the activity of the vortex would be slightly—but not too far—under the coefficient of his heaviest bomb. Another flick of his mental trigger and he knew the exact velocity he would require. His hand swept over the studs, his right foot tramped down, hard, upon the firing lever; and, even as the quivering flitter shot forward under eight Tellurian gravities of acceleration, he knew to the thousandth of a second how long he would have to hold that acceleration to attain that velocity. While not really long—in seconds—it was much too long for comfort. It took him much closer to the vortex than he wanted to be; in fact, it took him right out over the crater itself.

But he stuck to the calculated course, and at the precisely correct instant he cut his drive and released his largest bomb. Then, so rapidly that it was one blur of speed, he again kicked on his eight G's of drive and started to whirl around as only a speedster or a flitter can whirl. Practically unconscious from the terrific resultant of the linear and angular accelerations, he ejected the two smaller bombs. He did not care particularly where they lit, just so they didn't light in the crater or near the observatory, and he had already made certain of that. Then, without waiting even to finish the whirl or to straighten her out in level flight, Cloud's still-flying hand darted toward the switch whose closing would energize the Bergenholm and make the flitter inertialess.

Too late. Hell was out for noon, with the little speedster still inert. Cloud had moved fast, too; trained mind and trained body had been working at top speed and in perfect coordination. There just simply hadn't been enough time. If he could have got what he wanted, ten full seconds, or even nine, he could have made it, but....

In spite of what happened, Cloud defended his action, then and thereafter. Damnitall, he *had* to take the eight-point-three second reading! Another tenth of a second and his bomb wouldn't have fitted—he didn't have the five percent leeway he wanted, remember. And no, he couldn't wait for another match, either. His screens were leaking like sieves, and if he had waited for another chance they would have picked him up fried to a greasy cinder in his own lard!

The bomb sped truly and struck the target in direct central impact, exactly as scheduled. It penetrated perfectly. The neocarballoy casing lasted just long enough—that frightful charge of duodec exploded, if not exactly at the center of the vortex, at least near enough to the center to do the work. In other words, Cloud's figuring had been close—very close. But the time had been altogether too short.

The flitter was not even out of the crater when the bomb went off. And not only the bomb. For Cloud's vague forebodings were materialized, and more; the staggeringly immense energy of the vortex merged with that of the detonating duodec to form an utterly incomprehensible whole.

In part the hellish flood of boiling lava in that devil's cauldron was beaten downward into a bowl by the sheer, stupendous force of the blow; in part it was hurled abroad in masses, in gouts and streamers. And the raging wind of the explosion's front seized the fragments and tore and worried them to bits, hurling them still faster along their paths of violence. And air, so densely compressed as to be to all intents and purposes a solid, smote the walls of the crater. Smote them so that they crumbled, crushed outward through the hard-packed ground, broke up into jaggedly irregular blocks which hurtled, screamingly, away through the atmosphere.

Also the concussion wave, or the explosion front, or flying fragments, or something, struck the two loose bombs, so that they too exploded and added their contribution to the already stupendous concentration of force. They were not close enough to the flitter to wreck it of themselves, but they were close enough so that they didn't do her—or her pilot—a bit of good.

The first terrific wave buffeted the flyer while Cloud's right hand was in the air, shooting across the panel to turn on the Berg. The impact jerked the arm downward and sidewise, both bones of the forearm snapping as it struck the ledge. The second one, an instant later, broke his left leg. Then the debris began to arrive.

Chunks of solid or semi-molten rock slammed against the hull, knocking off wings and control-surfaces. Gobs of viscous slag slapped it liquidly, freezing into and clogging up jets and orifices. The little ship was hurled hither and yon, in the grip of forces she could no more resist than can the floating leaf resist the waters of a cataract. And Cloud's brain was as addled as an egg by the vicious concussions which were hitting him from so many different directions and so nearly all at once. Nevertheless, with his one arm and his one leg and the few cells of his brain that were still at work, the physicist was still in the fight.

By sheer force of will and nerve he forced his left hand across the gyrating key-bank to the Bergenholm switch. He snapped it, and in the instant of its closing a vast, calm peace descended, blanket-like. For, fortunately, the Berg still worked; the flutter and all her contents and appurtenances were inertialess. Nothing material could buffet her or hurt her now; she would waft effortlessly away from a feather's lightest possible touch.

Cloud wanted to faint then, but he didn't—quite. Instead, foggily, he tried to look back at the crater. Nine-tenths of his visiplates were out of commission, but he finally got a view. Good—it was out. He wasn't surprised; he had been quite confident that it would be. It wasn't scattered around, either. It *couldn't* be, for his only possibility of smearing the shot was on the upper side, not the lower.

His next effort was to locate the secondary observatory, where he had to land, and in that too he was successful. He had enough intelligence left to realize that, with practically all of his jets clogged and his wings and tail shot off, he couldn't land his little vessel inert. Therefore he would have to land her free.

And by dint of light and extremely unorthodox use of what jets he had left in usable shape he did land her free, almost within the limits of the observatory's field; and having landed, he inerted her.

But, as has been intimated, his brain was not working so well; he had held his ship inertialess quite a few seconds longer than he thought, and he did not even think of the buffetings she had taken. As a result of these things, however, her intrinsic velocity did not match, anywhere near exactly, that of the ground upon which she lay. Thus, when Cloud cut his Bergenholm, restoring thereby to the flutter the absolute velocity and inertia she had had before going free, there resulted a distinctly anti-climactic crash.

There was a last terrific bump as the motionless vessel collided with the equally motionless ground; and "Storm" Cloud, vortex blaster, went out like the proverbial light.

Help came, of course; and on the double. The pilot was unconscious and the flutter's door could not be opened from the outside, but those were not insuperable obstacles. A plate, already loose, was sheared away; the pilot was carefully lifted out of his prison and rushed to Base Hospital in the "meat-can" already in attendance.

And later, in a private office of that hospital, the gray-clad Chief of the Atomic Research Laboratory sat and waited—but not patiently.

"How is he, Lacy?" he demanded, as the Surgeon-General entered the room. "He's going to live, isn't he?"

"Oh, yes, Phil—definitely yes," Lacy replied, briskly. "He has a good skeleton, very good indeed. The burns are superficial and will yield quite readily to treatment. The deeper, delayed effects of the radiation to which he was exposed can be neutralized entirely effectively. Thus he will not need even a Phillips's treatment for the replacement of damaged parts, except possibly for a few torn muscles and so on."

"But he was smashed up pretty badly, wasn't he? I know that he had a broken arm and a broken leg, at least."

"Simple fractures only—entirely negligible." Lacy waved aside with an airy gesture such small ills as broken bones. "He'll be out in a few weeks."

"How soon can I see him?" the Lensman-physicist asked. "There are some important things to take up with him, and I've got a personal message for him that I must give him as soon as possible."

Lacy pursed his lips. Then:

"You may see him now," he decided. "He is conscious, and strong enough. Not too long, though, Phil—fifteen minutes at most."

"QX, and thanks," and a nurse led the visiting Lensman to Cloud's bedside.

"Hi, Stupe!" he boomed, cheerfully. "'Stupe' being short for stupendous, not 'stupid'."

"Hi, Chief. Glad to see somebody. Sit down."

"You're the most-wanted man in the Galaxy," the visitor informed the invalid, "not excepting even Kimball Kinnison. Look at this spool of tape, and it's only the first one. I brought it along for you to read at your leisure. As soon as any planet finds out that we've got a sure-enough vortex-blower-outer, an expert who can really call his shots—and the news travels mighty fast—that planet sends in a double-urgent, Class A-Prime demand for first call upon your services.

"Sirius IV got in first by a whisker, it seems, but Aldebaran II was so close a second that it was a photo finish, and all the channels have been jammed ever since. Canopus, Vega, Rigel, Spica. They all want you. Everybody, from Alsakan to Vandemar and back. We told them right off that we would not receive personal delegations—we had to almost throw a couple of pink-haired Chickladorians out bodily to make them believe that we meant it—and that the age and condition of the vortex involved, not priority of requisition, would govern, QX?"

"Absolutely," Cloud agreed. "That's the only way it could be, I should think."

"So forget about this psychic trauma.... No, I don't mean that," the Lensman corrected himself hastily. "You know what I mean. The will to live is the most important factor in any man's recovery, and too many worlds need you too badly to have you quit now. Not?"

"I suppose so," Cloud acquiesced, but somberly. "I'll get out of here in short order. And I'll keep on pecking away until

one of those vortices finishes what this one started."

"You'll die of old age then, son," the Lensman assured him. "We got full data—all the information we need. We know exactly what to do to your screens. Next time nothing will come through except light, and only as much of that as you feel like admitting. You can wait as close to a vortex as you please, for as long as you please; until you get exactly the activity and time-interval that you want. You will be just as comfortable and just as safe as though you were home in bed."

"Sure of that?"

"Absolutely—or at least, as sure as we can be of anything that hasn't happened yet. But I see that your guardian angel here is eyeing her clock somewhat pointedly, so I'd better be doing a flit before they toss me down a shaft. Clear ether, Storm!"

"Clear ether, Chief!"

And that is how "Storm" Cloud, atomic physicist, became the most narrowly-specialized specialist in all the annals of science: how he became "Storm" Cloud, Vortex Blaster—the Galaxy's only vortex blaster.

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