

Esquire

Killing for Survival: Page 70

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MAN AT HIS BEST

How to Win: Space-
Game Secrets Revealed

*I'VE HAD IT! His boss is about to fire him.
His body's a wreck. Our sex life is shot.
And for what? Some crummy sport.*

The Eternal Jocks



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PHOTOGRAPH • NEIL SELKIRK MAKEUP • **ARNOLD MEAKIN PIPKIN: HAIR • LAWRENCE DEPALMA OF PIPINO-BUCCHERI: STYLING • MARTHA PASCO BAKER**

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Check out the floor of any penny arcade. Among scruffy Keds and battered oxfords see the wing tips. The Guccis. Notice the bodies. Prosperous. Professional. Three-piece suits. Observe them stuff quarters into coin slots, and wonder as they battle a blip of a flying saucer with a wedge of a spaceship. Then ask yourself:
WHAT'S GOING ON HERE?

Invasion *OF THE* Asteroids

BY DAVID OWEN

Men prefer four things to women: fast cars, guns, camping equipment "tested on the slopes of Everest," and the World Series. This is a thought-provoking list and good as far as it goes. But lately there's been a fifth contender: a coin-operated, computerized video game (I hesitate to call it a game) named Asteroids.

It's lunchtime in Manhattan, and the Playland arcade at Forty-seventh Street and Broadway is crowded. Standing shoulder to shoulder with Playland's traditional clientele of Times Square drifters and truant schoolboys is what appears to be a full-scale assault team from the corporate towers of nearby Rockefeller Center. You can hardly move from one end of the place to the other without grinding your heel on somebody's wing-tip shoe. Over near the Seventh Avenue entrance, a tall, thin man with a briefcase pressed between his knees is hunched over a flashing pinball table called JAMES BOND. At a change station near the center of the room, a portly lawyer type is converting the contents of his wallet into enough quarters to bribe a congressional subcommittee. There are three-piece suits everywhere. But the densest agglomeration of gray wool by far stands at the very front of the arcade by a long bank

of thumping, thundering machines, where a veritable legion of young executives is lined up three deep to play Asteroids.

Asteroids, at the moment I am writing, is the most popular coin-operated game—video, pinball, or other—in the United States. It jumped to the number-one spot not long ago by out-earning Space Invaders, a simple-minded but wildly successful Japanese import that swept this country after creating something close to mass hysteria (not to mention a coin shortage) in Japan. Introduced in December 1979, Asteroids quickly became standard equipment in bars, arcades, and airports all over the country. Tavern owners who had previously been scared away from coin-op games by pinball's underworld reputation now began to clamor for Asteroids. Atari Inc., the game's manufacturer, had trouble keeping production in step with demand. There are now sixty thousand Asteroids machines on location worldwide, most of them in the United States and most of them astonishingly popular. Machines in hot locations have been known to bring in as much as one thousand dollars a week, enough to pay for themselves in a little more than a fortnight. Operators who tend fleets of machines are finding they have to make

extra trips to their locations just to empty the coin boxes of the Asteroids machines.

As impressive as the sales and collection figures are, one of the most intriguing facts about Asteroids is not how many people are playing it but which ones. Continuing a trend begun by its immediate predecessors, Asteroids has helped open up the coin-op market to a brand-new clientele: not just chain-smoking teenagers with time on their hands but responsible, well-paid men in their twenties, thirties, forties, and even fifties, who in some cases haven't seen the inside of an amusement arcade since the days when pinball games had pins. And now these men—these sober minions of the gross national product—are backing out of expense-account lunches and sneaking away from elegant restaurants to play Asteroids.

"I've pretty much eliminated lunch as an ongoing part of my daily routine," says a thirty-four-year-old stockbroker. "I'd rather play this game than eat. Along about four o'clock my stomach begins to growl, but Asteroids has made me a happy man."

You would think any game that could make a grown-up man do without fully one third of his daily intake of food would be a heart-stopper to look at, with pictures of

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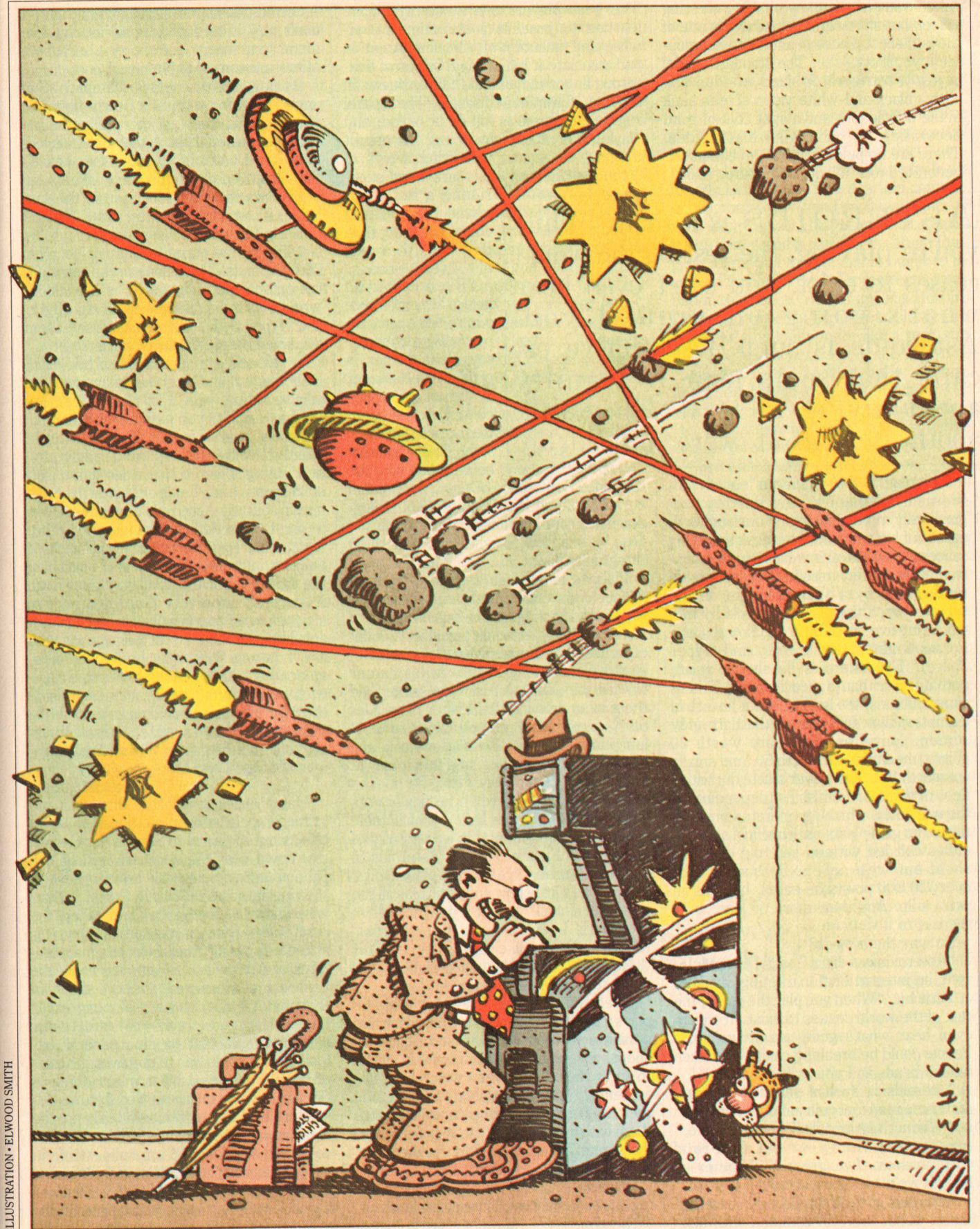


ILLUSTRATION • ELWOOD SMITH

Elwood Smith

A SHORT TIME AGO in a valley far, far away... an obsession far deeper than Space Invaders was born.

naked women on it and probably a steering wheel, but an Asteroids machine is one of the homeliest pieces of amusement equipment you'll ever see. The standard model is just a refrigerator-sized wooden box with a black-and-white video screen sunk in the middle of it and a light coat of paint decorating its otherwise black sides. There are no pulsing lights, no computer-generated rock music, no pictures of 007.

ASTEROIDS is a drug. While you're playing, the rest of the world ceases to exist. You can't even hear what's going on around you. Asteroids is such a seductive escape that some men feel guilty about giving in to it. They talk about it as if it were a bordello.

The object of the game is equally unadorned: to shoot at and destroy progressively more challenging onslaughts of space rubble and computer-directed flying saucers. The player's weapon in this confrontation is a tiny missile-firing spaceship represented by a triangular blip on the screen, which the player controls by manipulating five white buttons (Rotate Left, Rotate Right, Thrust, Fire, and Hyper Space). The asteroids he shoots at are nothing more than jagged little two-dimensional outlines, the largest about an inch in diameter, that drift across the dark-gray screen. Large asteroids are worth 20 points, mediums are worth 50, and smalls are worth 100. The player starts out with a fleet of three or four ships (depending on the machine), which he operates one at a time. His game lasts until his final ship has either collided with an asteroid or lost a shoot-out with an enemy saucer. For every 10,000 points he earns, he wins an extra ship. And that, more or less, is all there is to it.

So why the crowds?

"Asteroids is a drug," says Doug McIntyre, an international marketing manager at Time Inc. "When you play the game, the rest of the world ceases to exist. You can't even hear what's going on around you. People could be breaking chairs over each other's heads and you wouldn't notice."

Asteroids is such a seductive escape that some men feel guilty about giving in to it. "When I see people I know in here," says a fifty-four-year-old fast-food entrepreneur, "we greet each other as though we'd met in a bordello."

Asteroids isn't an intellectual game like chess. It has more in common with fast-paced physical sports like squash and handball, games that demand precisely honed reflexes and an acute spatial sense.

The best players are those who have learned to process a sometimes overwhelming quantity of visual information and translate it into a rapid series of dexterous finger movements. They thrive on a sense of imminent disaster. The central rule of the game is kill or be killed, and playing it is utterly absorbing. Players pit themselves against unnerving arrays of computer-directed adversaries and experience a brain-tingling infusion of adrenaline every time they work their way out of a bad corner.

"Eventually you get to the point where you're not even *concentrating* anymore," says John Fisher, a production manager at Warner Amex Satellite Entertainment Company. "You reach some kind of state of being at one with the

machine. Sometimes when I walk out of here it's almost like I'm high. Not falling-down drunk or anything, but I'll be in just a little bit of a daze, maybe an inch or so off the ground."

Fisher's enthusiasm may be somewhat suspect: his company, Warner Amex, is related by marriage to the manufacturer of Asteroids. But it makes a certain amount of sense that a man who plays a lot of Asteroids would gravitate in his career toward the source of his obsession. And there is no denying that Fisher plays a lot of Asteroids. "I played yesterday at lunchtime," he says, "and after work, and then again this morning, and then today at lunchtime." Don't worry that he doesn't have anything to do when he finally gets home: he and his wife have a pinball table in their kitchen. In fact, it was by way of pinball that Fisher came to Asteroids in the first place. "I've played pinball ever since I was a little boy, and I still play all the time. But pinball's gone way down in the last few years. I don't like the new electronic tables, and I don't like paying fifty cents for three balls. Now I play video games, too, and Asteroids is the best by far."

I peer over Fisher's shoulder while he plays a game. He maneuvers his spaceship behind a drifting asteroid and begins to shoot, wiggling the nose of his ship a little to spray the bullets over a wider area. His target splits with a satisfying rumble, and then the fragments detonate as he strafes them with more bullets. He rockets across the screen, dodging boulders as he goes, and begins to shoot again.

"Playing Asteroids is a little like directing a television show," Fisher has told me. "When you direct a show, you are in charge of what is generally a state of controlled chaos. You have to think fast. There's a level of excitement that builds and builds.

Asteroids is something like that. But I don't play it to duplicate something I've found somewhere else. I play it because it offers me something unique."

By now, the machine is thumping at an angina-inducing tempo, a nearly hypnotic rhythm reminiscent of the chilling heartbeat that pulsed through the soundtrack of *Jaws*. On his second turn, Fisher passes the 10,000-point mark and wrings an orgasmic peal of surrender from the machine, along with an extra turn. By the time he has worked his way through his last ship, he has earned a score of just over 26,000 points. This is one of the ten highest on the machine, so he is allowed to type in his initials, using the Left, Right, and Hyper Space buttons, and see them displayed beside his tally on the screen.

"I wrenched my back the other day," Fisher says, "and I've been taking codeine pills to kill the pain. But when I play Asteroids, I don't even notice that it hurts."

I know what he means. For the last four months I've been an Asteroids addict myself. Being addicted to a video game isn't so disruptive as being addicted to, say, heroin, but my Asteroids dependence has brought about definite changes in my lifestyle. I can't pass a bar anymore without peering into the doorway and searching the darkness for the faint gray glow of an Asteroids monitor. Sometimes I'm stricken with cravings so strong I'm unable to control them. Not long ago my wife and I, along with four or five friends, stepped into an ice cream parlor in Greenwich Village for a late dessert. Just inside the door was an Asteroids machine. While the others ordered sundaes, I emptied my pockets into the game. When I finally tore myself away, I was alone.

Major obsessions often involve a pilgrimage of one sort or another. In my case this meant a journey to Sunnyvale, California, down near the southern end of San Francisco Bay. Sunnyvale is one of several thriving outposts in "Silicon Gulch," otherwise known as the Santa Clara Valley, the cradle of the microprocessor industry. It is also the home of Atari Inc., the manufacturer of Asteroids. I wanted to meet the game's inventors and observe them in their natural environment. Among other things, I wanted to see what effect their line of work had had on their general outlook. If Asteroids was taking over the lives of men in business, what was it doing to the men whose business was Asteroids?

Atari has grown phenomenally in the eight years it has been in existence. The company was founded on a shoestring in 1972 by a twenty-nine-year-old computer engineer named Nolan Bushnell. Bushnell had invented a game combining a television screen, a few hand controls, and a relatively simple printed-circuit board, and he hoped that someone else would be interested in building it. He approached

every company in the amusement field but was turned down by all. He finally realized that if he ever wanted to see his game in production, he would have to manufacture it himself. The game was called Pong. It revolutionized the coin-operated-game business, laying the foundation for the boom the industry is currently enjoying, and brought Atari \$3 million in sales its very first year. In 1976 the company was sold to Warner Communications for \$28 million. Atari, which has consumer-game and computer divisions in addition to its coin-op group, expects last year's final business tally to be somewhere between \$300 million and \$400 million, of which Asteroids alone will account for approximately one third.

"Asteroids," says Mary Takatsuno, an Atari marketing analyst, "is the only game that ever stopped production lines in our plant. At break time, the entire assembly line would run over to play the machines that were ready to be shipped out. With other games, the guys would just assemble them and box them up, and that was that. But with Asteroids, nobody wanted to work."

Work is a word used very loosely at Atari. When I entered one of the fourteen buildings in Atari's still-growing complex, the receptionist was playing Missile Command, a relatively new game on display in the lobby. Each time her phone rang she ran back to her desk, glancing anxiously over her shoulder as the cities and missile bases she had been defending were incinerated by enemy attackers. Most of the Atari employees I saw projected an aura of almost delirious bliss. They didn't seem to think of themselves as working. This isn't a company, I said to myself, it's a candy factory.

All video games share a common ancestor—Pong. Pong is the great-granddaddy of them all, which begat, among other games, Avalanche, which begat, according to some authorities, Space Invaders, which begat, indirectly, Asteroids. Asteroids' direct ancestor was a game you've never heard of, unless you happen to work at Atari. The game was called Cosmos, and it never got any further than the early-prototype stage in one of the labs on the ground floor of the engineering building.

"Cosmos was a two-player shoot-'em-up game played on a field consisting of a few planets and some asteroids," said Lyle V. Rains, now vice-president of engineering at Atari, in whose office I had been deposited. "The asteroids didn't move. But while you were flying around trying to destroy the other player's ship, you could shoot at them if you wanted to. That was the most interesting part of Cosmos, unfortunately. The game died a slow, agonizing death."

A year and a half after the funeral, Cos-

mos began to weigh on Lyle Rains's mind. Space Invaders had just been introduced in America, and Atari was looking for a game that would do it one better. So one day Rains was quietly thinking about Cosmos, and thinking about the asteroids, when all of a sudden he began to wonder: What if all those rocks were moving around?

Two weeks later, Ed Logg, a programmer, had a working prototype that looked very, very good. Word started to get around. People would drop by Logg's lab just to say hi and then would refuse to leave. It got to the point where Logg was spending a lot of his time shooin' grown men back into their offices. He finally had to build two prototypes, one for him to work on and another for his colleagues to play. "At first we called it Champagne Wars," Rains continued, "because the asteroids looked sort of like the bubbles on Lawrence Welk."

Lyle Rains is twenty-nine years old. He came to Atari seven years ago, immediately after graduating from Berkeley. He figured he'd work a year or two and then go earn another degree. At Berkeley he had majored in electrical engineering, with a specialization in automatic controls—"controlled feedback systems, robot technologies, process controllers, controlling motors"—heavy stuff. Now he's hooked on games, at least for the time being.

"When Asteroids was in the labs," Rains told me, "there were nights when I would stay here until one or two in the morning, just playing the game. I was addicted." I asked him if he still played. "No, not really," he said. "What you've got to realize is that by the time these games

them; one round blurs into another, and I kept having the strange feeling that I was doing something for which I would eventually be punished. But for a moment—a brief moment—I felt like an employee.

Ed Logg, the man who put Asteroids on the monitor (and who dreamed up most of the game's complexities), is a thirty-two-year-old computer programmer who looks exactly like a thirty-two-year-old computer programmer. When I spoke with him he was wearing a light-green shirt, dark-green pants, and a pair of gray Hush Puppies, a brand of footwear that ought to be awarded a Nobel prize for indirect contribution to science. With Logg was Howard Delman, a twenty-eight-year-old design engineer who looks more like a rock star than like the supervisor of the electrical engineers, which is what he is. Delman designed the printed-circuit board in which Logg's Asteroids program resides. He also created the game's distinctive sounds (of which there are eleven).

"Friends call me up all the time," Delman said, "and ask, 'What's the secret of Asteroids?' I say, 'Just play it a lot. That's the only secret. It takes a lot of practice.'"

I was delighted to hear this, since my wife had recently wondered aloud whether I wasn't spending too much time and money on Asteroids. Now I'd be able to tell her, Sorry, honey, the guys who *invented* the thing told me to *practice*.

When Asteroids was in development, Logg occasionally eliminated some of the game's randomness, just for fun. Once he installed a secret "kill switch" that would destroy the spaceship of anyone he hap-

pened to be playing with. Another time he altered the program so that the high-score table would refuse to display the initials of one of his colleagues. (The engineers like to plot practical jokes on one another: they once considered implanting electromagnetic devices in the ears of their boss's tropical fish, hoping to make the fish turn upside down every time

ASTEROIDS is the only game that ever stopped production lines at the Atari plant. At break time, the entire assembly line would run over to play the machines that were ready to be shipped out. They were blissful. This plant was more like a candy factory than a company.

reach the market, we've been playing them, sometimes constantly, for six or seven months."

Later I was able to spend a couple of hours in Atari's game room, an arcadefake space purported to contain one each of every game the company has ever made. Not just a candy factory but a candy *store*, and everything in it free. My mind slowly bogged. I played Video Pinball and a couple of driving games, then abandoned my attempt at ecumenicism and devoted a good ninety minutes to Asteroids. It's eerie playing games without paying for

he answered his phone.)

You might think that these men who literally hold the game's secrets in their hands would be among the hottest Asteroids players in the world. But this is not the case. The record score in the engineering building when Asteroids was introduced (at which point the game, in more or less its final form, had been in existence for half a year) was around 90,000. This is a very respectable score by any accounting. But within only a few months, people at Atari began to hear

rumors that players in the field were earning scores many times as high—that they were, in other words, beating the machine, which won't register a score higher than 99,990.

The engineers were incredulous. They refused to believe that ordinary humans could beat them at their own game. And they didn't start believing it till someone from marketing drove them out to an arcade and made them look for themselves.

"What had happened," Eugene Lipkin, then president of Atari's coin-operated game division, told me, "was that a player had been smart enough to understand the movement and the programming on the product and had then come up with an idea of how to work around it. It took about three months for that to happen. Then, all of a sudden, we began hearing the same thing from all over. People had figured out that there was a safe place on the screen."

What Lipkin meant by "a safe place on the screen" requires an explanation. One of the principal challenges in Asteroids is a tiny flying saucer that zooms across the screen toward the end of every onslaught of rocks and fires bullets at the player's spaceship. This saucer, if destroyed, is worth one thousand points, but because it has better than average aim, it's a formidable adversary. Or at least it was until players began to figure out that if they picked off all but one or two little asteroids, they could safely lurk around the edges of the screen and wait for the saucer to appear. If it appeared on the side where they were lurking, they would fire quickly and destroy it before it had a chance to get off a shot. If it appeared on the other side, they would fire off the screen in the opposite direction (bullets can "wrap around" in Asteroids) and send a couple of quick salvos up the saucer's tailpipe. And they would keep doing this until they had accidentally destroyed the remaining little asteroids (causing a new onslaught to begin), or crashed into the saucer, or earned 10,000,000 points, or simply fallen asleep. As long as one or two rocks were left on the screen, the little saucer would continue to appear. Playing the lurking game isn't as easy as it sounds—it takes an alert player with a steady eye to pull it off—but once a player gets the hang of it, Asteroids changes completely. In fact, it ceases to exist.

A *flaw* in Asteroids? I'm afraid so, and this is a great philosophical issue, one that separates the men from the boys as far as the game is concerned. As most people who are familiar with Asteroids know, there are essentially two kinds of players: those who play the game and those who lurk. Lurking is a weakling's strategy, a method mediocre players use to inflate their scores (it's also extremely boring to watch). It's like fishing with dynamite.

Happily, the people at Atari dislike lurkers almost as much as I do. "What we've done," Lipkin told me, chuckling

evily, "is put together a new program in which..." But I'd rather not give it away. Suffice it to say that this new feature is available to operators in the form of a computer chip that can be inserted into the printed-circuit boards of existing Asteroids machines. This chip is proving to be a popular little item, too, since operators don't make as much money when games last twenty-two hours as they do when they last ninety minutes.

And the engineers had yet another trick up their sleeves: Asteroids Deluxe. Lyle Rains had promised to introduce me to it. Lurkers, your days are numbered.

Thus, at the culmination of my Asteroids quest, the gods deigned to grant me a vision of the future: I would be among the very first people in the world to

lay eyes on Asteroids Deluxe. And there was a sense of mischief about my expedition, because the arcade where the prototype was being tested was part of a chain owned by Bally Manufacturing Corporation, the American manufacturer of Space Invaders and Atari's largest competitor.

Even though it was a school day—about fifth period, I calculated—the arcade was filled with seventh graders. Rains and I waded manfully into their midst and eventually won a place on the Deluxe machine, a striking piece of equipment with a vastly more colorful exterior than the original game has. We began to play. The monitor was slung low in the cabinet, out of the player's line of sight, and the images on it were projected upward onto a half-silvered mirror, which the player looked into. The mirror made the rocks and vehicles seem to hang in the air. Visible through the mirror was a gaudy painted background of tumbling asteroids and elaborate spaceships and orange stars. The visual effect was stunning, but also unsettling. Successful Asteroids play requires a Zenlike diffusion of concentration, in which the player sees everything but looks at nothing in particular. I found it difficult to achieve this state on the new machine. There were too many distractions. Rains said that the problem had come up before and that the engineers were working on it.

Aside from its strictly visual gimmickry, the Deluxe prototype had a number of new features intended to make the game more challenging. There was a brand-new alien spaceship, for example, which Rains referred to as "the snowflake"; when I shot it, it broke into a half-dozen guided mis-

siles that chased me around the screen with a doggedness that increased as my score did. The Hyper Space button was gone. In its place was a button labeled Shields; when I pressed it a circular force field formed around my ship, protecting me from rocks and bullets but fading and eventually disintegrating with use. The rocks rotated unnervingly. The machine, Rains said, would record scores of up to 1,000,000 points.

Asteroids Deluxe was proving very popular. Marketing data from the initial field test indicated that the game was being played virtually every minute the arcade was open. I wasn't so impressed, though. The prototype struck me as unnecessarily frilly, something like the Thunderbird after Ford decided to turn it into a full-sized car. An important part of

ASTEROIDS' engineers have a new trick up their sleeves. They call it Asteroids Deluxe, and it's a striking piece of equipment. It has a new alien spaceship and a Shields button to replace Hyper Space. It has also been entirely re-programmed. So lurkers, beware.

the game's appeal is the uncluttered elegance of its original concept. Chess wouldn't be more interesting if you played it on a discotheque dance floor, and Asteroids isn't more interesting when you play it on a one-way mirror. And besides, in four games I didn't score over 10,000.

I'm glad to be back in Playland again, playing good old first-generation Asteroids. It's four o'clock now, so John Fisher and the rest of the lunchtime crowd are gone. They're moping in their offices, stomachs rumbling, waiting for the workday to end so that they can come back here and unload a few more dollars. I'll probably be here to greet them when they return. I've got most of fifteen dollars' worth of quarters stashed in various pockets—enough to last me until well after dark. Not that I have any business spending more hours here today than I've already spent. I should be home now, thinking of interesting things to say to my wife or making something for dinner. Maybe I could turn all these quarters into some kind of rib-sticking casserole. I feel tired and a little groggy, and yet I can't honestly say that I want to play any *less* now than I did at noon, when I began. Still, a man has responsibilities. I finish a decent game, type in my initials, and decide to call it quits.

And then I reach into my pocket and plug in another quarter.

PROGRAMMERS' NOTES: How to Win at Asteroids

Despite the fact that most Atari programmers and engineers are extremely conservative players, they can be handy people for an Asteroids player to know. Following is a list of hints, tips, and company secrets that ought to improve your game.

□ 1. If you want to *sound* as if you know what you're doing when you play Asteroids, you can throw around some of the in-house slang that has grown up around the game. At Atari, the little flying saucer is called Mr. Bill; his big brother is Sluggo. Mr. Bill and Sluggo are also known as *drones*, which is a company word for the "computer-controlled intelligences" in video games. Turns or plays are known as *lives*. Each new series of asteroids is called a *wall* or *wave*. Individual asteroids are referred to as *rocks*.

□ 2. Sluggo fires at random; Mr. Bill aims. "Mr. Bill knows where you are, and he knows what direction you're moving in," explains programmer Ed Logg. "He takes this information and picks a window bounded a few degrees on each side of you, and then shoots randomly inside of that. For this reason, you should never move straight at him. It makes you bigger relative to him. The farther away you are, the smaller a target you are."

□ 3. The higher your score is, the more accurate Mr. Bill becomes. When your score reaches 35,000, he narrows down his firing window and increases his chances of hitting you.

□ 4. Although Mr. Bill aims at you, he doesn't fly at you—at least not on purpose. His movements, like Sluggo's, are randomly determined within well-defined limits. His horizontal speed is always the same, which means he moves faster when he changes his angle of movement—something he does every second or so.

□ 5. The first wall in an Asteroids game consists of four rocks, the second of six, the third of eight, and all succeeding walls of ten. (In Asteroids Deluxe the sequence is six, seven, eight, nine.)

□ 6. The position, direction, and speed of the rocks at the beginning of a wall are random within a certain range. Contrary to what many players believe, the rocks do not speed up as the game progresses.

□ 7. Every large rock contains two medium-sized rocks, each of which contains two small rocks. Smaller rocks are positioned at random within larger ones. When a moving rock breaks up, the smaller rocks that constitute it will tend to move in the same direction the larger rock was moving in ("There is conservation of momentum," Ed Logg says), although pieces will occasionally break off in the opposite direction. It is safer to fire at rocks that are moving away from your spaceship.

□ 8. Your spaceship can fire up to four shells at a time. Once those shells have been fired, you can't shoot again until one of them either hits something or dies of old age. The lifetime of a shell is somewhat shorter than the time it would take it to travel all the way across the screen.

□ 9. Because your ship's gun reloads every time one of your bullets hits something, you can sometimes fire in long, satisfying streams if you aim carefully at compact clusters of rocks.

□ 10. If you are moving forward when you fire, your shells travel faster than they do if you are standing still. If you are moving backward, they travel more slowly.

□ 11. Ed Logg's space, like Albert Einstein's, is curved: any object that disap-

pears off one side of the screen reappears at the corresponding point on the opposite side. It is thus possible (and often desirable) to destroy objects by firing *away* from them. (This fact, sadly, is one of the keys to the odious lurking strategy.) In the original Asteroids, Mr. Bill does not take advantage of this wraparound effect, aiming only "into the screen" even when he would have a better chance of hitting you by firing off the side.

□ 12. No rock moves straight up and down or straight across the screen. If the rocks were allowed to do that, it would be possible to have on the screen a rock that you wouldn't be able to see. As is also true of your television set, the picture on an Asteroids monitor is usually somewhat larger than the screen. This means there is sometimes a fairly wide margin of invisible space around the edges of the visible image. If the rocks could travel parallel to either of the axes, you could have one in the invisible margin and never find it unless you hit it by accident.

□ 13. When you push the Hyper Space button, you have approximately one chance in five of blowing up on reentry, even if you rematerialize in an empty section of the screen. Players who rely heavily on Hyper Space are taking their lives into their hands. The best players use the button only in dire emergencies.

□ 14. If your favorite Asteroids machine one day seems faster than usual, the operator may have installed a modification kit to speed it up. These kits increase the speed of all moving objects on the screen (including your spaceship and its bullets) by close to 50 percent.

□ 15. The maximum number of objects that can appear on the screen at one time is thirty-five: twenty-seven rocks, one drone, two drone bullets, your spaceship, and four of your spaceship's bullets. With any more objects than that, the computer wouldn't have time to make the necessary calculations, and the game would visibly slow down. As it is, if you get close to thirty-five objects, you can sometimes do things like destroy big rocks with single shots—one of the most rewarding experiences the game has to offer. —D.O.



**A SPACESHIP
in pursuit of two
asteroids. This
game requires more
than just skill,
concentration, and
good luck. It also
demands a fistload
of quarters.**