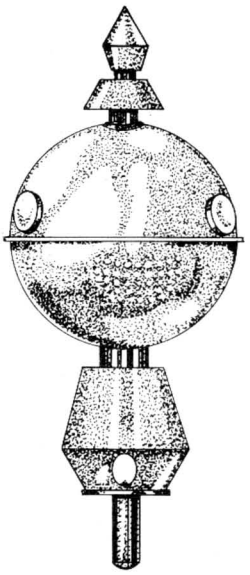
ROBOTS IN STAR TREK®



by **Pete Rogan**

Say "robots" and people think of mechanical men, R2-D2 and Isaac Asimov. Say "*Star Trek* robots" and people don't quite know what you mean. But what about M-4, Flint's robot in "Requiem for Methuselah"? How about the androids of "I, Mudd", "What Are Little Girls Made Of?", and "Return to Tomorrow"? Androids in that episode were built on the *Enterprise*. Robots in *Star Trek* exist, even abound, but they are very carefully disguised. When they aren't disguised, they are handled very, very carefully.

Robots are as old as science fiction, older, even. The Golem of Biblical fame was a constructed machine made to look like a man. Virgil is said to have had bronze archers defending his estate. The fascination in making a machine in the form of a human being, capable of performing a human task, is an ancient one that continues to fuel modern imaginations. Industrialization, the development of electronics and the computer have changed the old idea of robotics completely. Machines of the 20th Century not only perform physical labor, but can take over human mental efforts, as well.

For all their universal application, robots are not common sights in the Star Trek universe. When a machine identifiable as a robot makes an appearance, it is handled very gingerly. The first meeting between Kirk and his party and the robot M-4 was a hostile one. Why, in so technologically advanced a society, should this be so? Why don't we see a lot of mechanical men, droids, waldoes, and such cohabitating with humans?

MEN AND MACHINES

By the late 20th Century, robots were virtually universal, and by far the larger portions of them did not fit the man-form historical image of "robots". An industrial robot was nothing more than an arm, often without even the most rudimentary of sensors, and an aircraft autopilot was no more than a box that used the entire craft as its "body". So-called "smart" machines, with computer-assisted functions, littered everyday life. Ground cars could keep track of their own fuel and maintenance status, home appliances could monitor their own safety performance, and home computers could peform an amazing range of duties, from playing games to balancing your budget to keeping an agenda for a household. Before the 21st Century was very old, a machine with computer guidance could be made to perform almost *any* task a human being could perform. Robots could be built to diaper a baby, mow a lawn, drive a car, even supply first aid. It was even possible to construct artificially-intelligent machines that looked very much like humans, enough to fool the casual observer. The Age of the Robot had fully arrived.

There wasn't much of a market for them, really. People felt uncomfortable and unnecessary with machines that could do anything they could do, better, more accurately, and faster. There were many things that computers and robots made easier, or even possible, that were beyond human capabilities and that added to the welfare and comfort of human beings. But, after having the possibilities saturated, people began to feel that some things needed to be done by hand to prevent technology from dehumanizing them. So no one wanted a baby-diapering machine, or could afford an automatic shoe-tier. With the depredations of the Eugenics Wars, the value of that neglected quality, "humanity", was cherished even more. People, as they were, were more important than any tool or futurisic improvement.

Out of that time grew the basic ethic of man and machines, and after other spacefaring races were discovered, was found to be common to all the most advanced. Though it has never been fully stated, its basic premise is simple: Robots, computers, and other machines are only tools to serve human needs. Only human beings can understand and find ways to meet those needs. To let a machine do it is a lessening of humanity.

The idea seems reactionary and antiprogressive, but it made possible the human exploration of space and the spread of human civilization. Even on the primitive Apollo and Skylab missions, the supremacy of human beings over their tools was intended and necessary. If it weren't for human intervention, mechanical failure would have terminated many missions. On the Apollo XIV moon landing, the entire expensive remote sensor array would have been useless because of a malfunctioning reactor unit. An astronaut repaired it by pounding on the reactor with a hammer! On Skylab, the entire space station would have been lost had it not been for astronauts who deployed the faulty solar panels and placed a thermal "umbrella" to shield the station from the sun. It has been the unvoiced assumption of all space exploration that the most important thing to send is man himself.

The ethic also has a present value to all starfaring races. Because the capabilities of machines are expanding enormously, there is a real danger in creating a computer, a robot, or a device that would not just aid living beings, but replace them when it should not. There will always be a large grey area between things living beings should do and those that machines should. It is invaluable to learn a foreign language, for instance, to understand the way the beings who use it think, feel, and believe. No one can study Vulcan logic without having to absorb the Vulcan language and its simple, precise grammar and rigid, reliable values. In Vulcan, one word serves for both "and" and "but"; it is difficult to explain why without seeing that, to a Vulcan, the words have equivalent meanings but for an emotional component that merely dis figures logical understanding.

But, in practical use, since the average intelligent being may need to converse in several languages not native to his or her homeworld, electronic translators are invaluable. Is it wrong to use them in conversation, say, if an Andorian visits Earth and hasn't the time to learn English, French, Spanish, and so on? The use of such devices does irritate and offend some people, much as 20th century phone-answering machines did. But then, as now, people coped by learning new rules of etiquette and conduct. The flexibility of living beings is often tested by new technology, and much that is necessary to Federation civilization would be lost to machines if they were not "kept in their place".

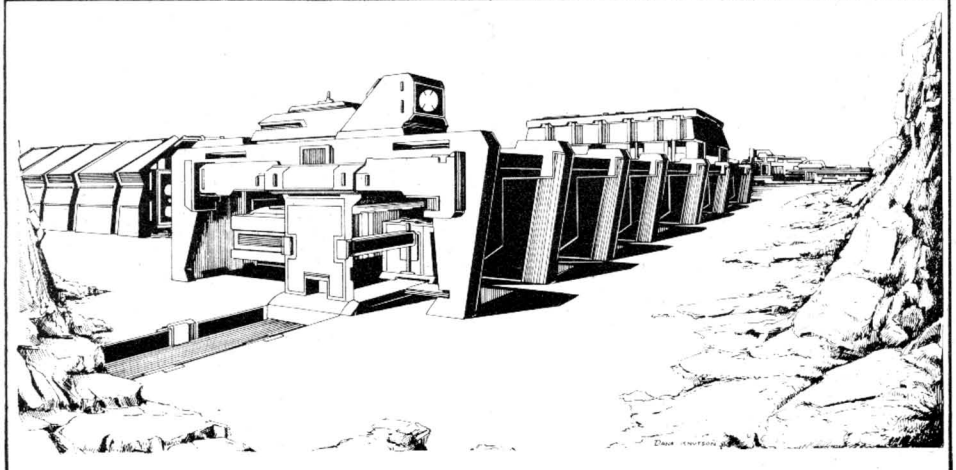
In general, there is nothing wrong with using machines to make a difficult or tedious task easier, but, if a machine is used to do too simple a task, it is as inappropriate as riding a motorcycle indoors. One always uses just enough tools to do a job, and avoids using more.

ROBOTS IN *STAR TREK* DAILY USAGE

Robots literally crowd the 23rd century, but they are so subservient and well-tamed that their presence is hardly noticed. They rarely look like living beings and they don't seem like robots; they have no arms, or legs, no eyes or independent choice of motion or destination, and they don't talk back. Some people might find them hardly robots at all, but they are. They are robots built to the 23rd Century ideal; they do just what they are supposed to do, whether it is moving people from place to place (like turbo-lifts) or making them a meal (like food processors).

There are robots of immense sophistication and intelligence, with quite a good deal of free choice. They tend to be of immense size also, and they are usually found in space, far from any inhabited world, performing tasks that would otherwise be impossible to do. The two largest classes of such robots are automated mining and extraction stations, and robotic starships.

Automated mines are the largest robots built by Federation beings. They can be vast, sprawling aggregations of machinery covering many kilometers of land and water, or occupying thousands of cubic kilometers of empty space. They do the basic extraction work required for maintaining the industrial framework of the Federation, locating and mining and refining metals, minerals, petroleum, and hundreds of other substances in thousands of distant and uncomfortable locations. Robots extract lithium from the bottom of chlorine atmospheres and rubies from the floor of the ocean. They collect meteoric nickel-iron from asteroid belts and scoop rare gases from the cloud tops of gas giants. They do all this in lonely, self-contained splendor, for, after their construction and activation, it could be decades before another living being ever saw them again.



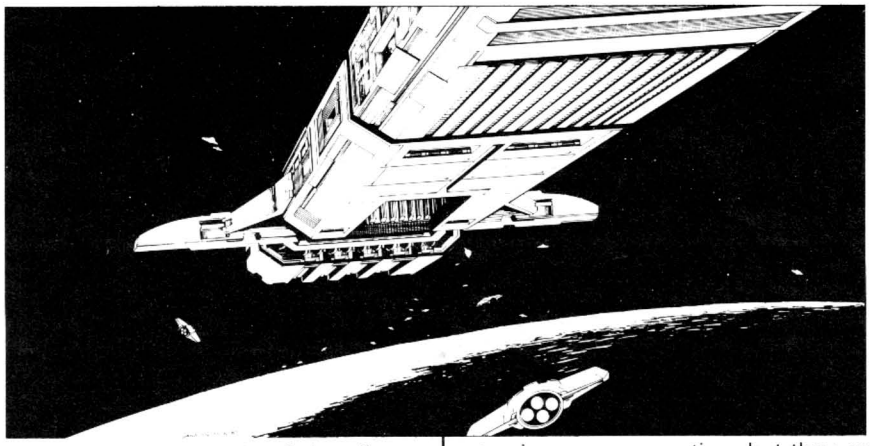
Automated mining stations make their own spare parts, do their own repair work, and oversee their own procedures and efficiency. They even do their own prospecting with separate robotic vehicles. Since they have no living beings to endanger, most of the time, they can be immensely efficient and terrifyingly fast. The depths of an automated mine would strain Dante to describe, for they would be airless, lightless, heatless pits filled with massive, hurtling machines in ceaseless motion.

Such installations, however autonomous, still have stations for living personnel to oversee and even override their operations in emergencies. Every automated extraction station has a control room with readouts and controls for all the automated functions, including the installation's computer. There are arrangements for living quarters, should a crew need to stay over for any length of time. Federation law requires such a set of manual overrides and living quarters on automated stations, regardless of the size or unlikelihood of interference. Many mining companies have elaborate security systems protecting their investments from unauthorized use; no one can just land and take over a megacredit mining station with the press of a button.

Semi-automated facilities, with small but present complements of live workers, are the general pattern for all industry in the Federation, including some harvesting and foresting operations that could be done entirely with machines. There is something horrible about an automated machine devouring a pristine wilderness, so foresting and sea-fishing factories have live overseers with the education and training to avoid ecological damage.

Automated starships are the largest mobile robots ever made, and they are, after the automated extraction stations, the foundation of the Federation's industrial wealth. Robotic ships carry the products of robotic extraction stations to markets at habitable worlds, ply the lonely but well-travelled routes that would bore live crews, and provide raw materials to industry at historically low costs.

Most automated ships are gigantic, massing up to one million tons and can go higher. Nearly all of them are intended for large-scale bulk shipping, though there are some few exceptions. Under computer control, these ships fly themselves from inhabited factory worlds to the automated stations, where they are loaded in orbit by robot lighters. These automated shuttles generally are made to standard sizes, the better to fit the automated cargo ship's



loading apertures. A robot lighter literally plugs itself into one of the standard docking ports, and the ship's own cargo-handling apparatus opens its nose, extracts the cargo, seals the lighter, and ejects it for its downward journey. Newer automated vessels have bulk transporters for faster cargo handling, but since most automated ships and stations have long service lives and the majority of them predate the transporter era, robot lighters are likely to be around for quite a few years yet. Cargo unloading at a destination world is another matter, where time is a factor, and robotic lighters are sometimes assisted by live workers and newer technology.

Like automated extraction plants, automated starships are required by law to have manual controls and life-support machinery. Unlike fixed installations, robotic starships have very Spartan and utilitarian accommodations. A robotic extraction station may require a large contingent of programmers and technicians to change the basic functioning of the entire station, but a ship, being much simpler, can be repaired either very quickly or only at a shipyard. Its manual controls tend to be smaller, though they tend more to diagnostics, and the computer station is much more massive than in crewed ships.

Flying a robotic starship through its manual controls is a torture to be avoided, if at all possible. A robotic ship's profile is very different from a crewed vessel's; virtually nothing about an automated ship will be familiar to anyone with only crewed-vessel experience. For one, the gradations of engine power are coarser; the ship accelerates and decelerates quickly, in maddening and possibly damaging (to living beings) jerks, whether at warp speed or at sublight velocities. Robotic ships maneuver very slowly, partly because of their mass, and partly because they are not built for rapid course changes. The crude speed controls and sluggish steering are aggravating, but they are compounded by a very simple set of sensors. Robotic ships normally navigate through so-called "transit windows", slices of space and stars carried in computer memory. A ship passing through one of these "windows", if it goes through the approximate center, will arrive at its destination. The navigation computer usually just compares very low-grade sensor data with its memory of a "window", correcting course as needed, and using short-ranged sensors and navigational deflectors to avoid or just shove out of the way objects in its path. A live crew must either provide new navigational "windows" for the computer, fly along the course "window" designate, or have their destination in sight via the short range sensors. It's easy to see why most manual pilots prefer to steer robotic ships to drydock via remote control whenever possible. Flying an automated starship on its manual controls, according to one pilot, is like "jockeying a million-ton jeep".

Sometimes there is no choice, as in the very rare occasions of crippling damage or stranding. An automated ship unable to make way will send out a distress signal asking for rescue and repair. A reward for rescuing and repairing such ships is usually offered by the owners, with a small reward for the first vessel reporting its position and status if rescue isn't possible. If the ship is destroyed, no reward is paid. Most of the time engine malfunctions are the cause of stranding, but, occasionally, worse fates befall them. Such ships are easy prey for pirates, though, unless they have a use for several million tons of raw materials like clay or crude oil, the taking is not worth the effort. Yet it happens. Much more rarely, a ship encounters an object or phenomena in its path, such as a nearby ion storm, a severe solar flare, or other event that the computer cannot deal with and refuses to take the ship into. Robotic ships have a very good survival instinct.

Once in a while, the worst possible thing happens, and the computer breaks down. Most of the time, triple back-ups keep the ship flying, but sometimes a breakdown occurs that can't be bypassed, and the ship's performance is degraded. A robotic ship with a faulty computer may veer off-course, strand itself near or on a world, send out a false distress signal (or none at all, more likely), even tag along behind the first ship it encounters. Companies that own robotic ships will pay to have these vessels rescued, just as if they had broken down normally, but rescuing such a ship with a malfunctioning computer is extremely hazardous. Literally anything can happen with such a disabled machine. One, the *Greely Sentient*, nearly succeeded in ramming the *Argon Explorer*, a much smaller ship that was attempting to close with the erratic vessel.

Robotic systems with very little or no human supervision are occasionally found in other, usually unique applications. Deep space warp probes, gathering general information in sparsely-settled regions of space, are a Federation fixture. Sometimes merchant companies use backup robotic systems on ships going into unknown or hostile territory, with orders to return at all costs if anything happens to the crew. And, of course, where labor is hard to come by, mobile man-sized units and androids can be found.

Robots with volition, the ability to make decisions on their own, are not often found in the Federation. The reason is simple to state but hard to explain. The normal human brain contains some ten to the tenth power neurons, the basic "switches" in the human computer. Artificial neuristors, the basic building-block for duotronic computers and higher systems, have been put together in aggregates as large as five times the human average. Theoretically such machines, being able to use all these circuits instead of a paltry 20% or so that human beings do, should also be that much smarter. Actually, since nerve cells transmit impulses at only 100 meters/second or so, and a computer transmits them at just under the speed of light, they should be incomparably faster at thinking. They are not. The few times that such devices have been put together of such size, they have failed to meet the design parameters. How badly they missed them may never be known; the Federation has classified all information concerning superintelligent cybernetic devices. Rumors in the artificial intelligence field say that these devices nearly always suffer "nervous breakdowns" of

startling proportions, usually within a few minutes of activation. Simply put, superintelligent computers are being built; they just do not work.

The most reasonable explanation has to do with programming. As computers grow larger, their "education" must be more carefully tailored and administered to aid in cognition or "thinking". It takes years to educate a baby, a far simpler piece of cybernetic engineering than many computers, into a useful and functioning individual. Apparently, highly complicated computers require much of the same sort of treatment. Exactly what kind of programming this would entail has yet to be determined. To produce such superintelligent machines may be technically feasible, but may also require a supereducation beyond the current capabilities of any Federation race.

We know of such projects and their disappointing results because of the notable failure of one of the more spectacular supercomputer designs: the M-5 multitronic unit invented by Dr. Richard Daystrom. In that experiment, a computer with Dr. Daystrom's personality engrams superimposed on it became confused and took a simulated attack for the real thing, destroying the Federation Heavy Cruiser *Excaliber*. It has never been made clear whether Starfleet knew of the engrams before the real test; in any event, no one seems to have predicted the results. It will likely be a long while before Starfleet again attempts to put combat capability into robotic hands. For the conceivable future, in all applications where man and machine must work together, living people will always be in charge. At least within the Federation.

ENCOUNTERS WITH ALIEN ROBOTS

Not everybody in the Galaxy believes in the primacy of live beings over machines. In many cultures, the "cult of the computer" has completely taken over; the most striking example is that of Beta III, a culture completely stultified by the computer named Landru. A number of cultures have built perfect androids and allowed them to run their civilization for them. These cultures declined, but their androids did not. Exo III and the dubiously-named "Mudd's Planet" have advanced industrialized android societies but only scattered reminders of their long-dead builders.

Such limited studies of android societies as have been done show that the androids by themselves have almost no motivations. They do not hunger or thirst, aside from a need for energy and the odd part or two, and they have no desire to create or advance themselves. The studies suggest two things: purely machine-maintained cultures are less vigorous and thus less viable than those that living beings create; and that the android cultures that remain reflect at least partly the emptiness of their makers, in that they wish only to maintain, to serve, to protect, and not to strive, to build, to exceed their limits. The symptoms of decline, in other words, may very well be the disease. A number of prominent Federation social scientists, led by Dr. Samuel Loring of Texas, Earth, have gone on record saying the desire to stop striving as a culture is tantamount to decline. Some other authorities say Dr. Loring's theory is tantamount to the Klingon "grow or die" dogma. Dr. Loring has refuted this contention, and pronounced such authorities as "dumber than ditch carp."

Advanced civilizations tend to produce advanced machines, and so the Federation is constantly encountering alien devices made to meet alien needs. Many of these have an artificial intelligence, or follow programming, or even resemble the physical shape of their makers. Many of the more interesting and dangerous artifacts of alien races are robots.

Some races have been shy, and sent out probes and artificial facsimiles of their selves to encounter aliens, in space and elsewhere. Sometimes, the purpose of robots has been entirely irrelevant to the circumstances of contact; Starfleet and some private vessels have many times encountered robotic mining and extraction stations and ships belonging to races unknown to the Federation. Robotic colony ships have been found, such as the asteroid *Yonada*, intended to carry a civilization on a centuries-long sublight trek to another habitable world.

Not very long ago, an outpost of the long-dead Kalandan Empire was discovered, empty of life but still functioning, with a deadly self-defense system relying on projections or perhaps android constructs of its last occupant to destroy intruders. Unfortunately, the outpost's computer was itself destroyed before it could be studied, and other explorations in the same region of space are spotty and incomplete; we do not know the full nature of the Kalandans or their machines, which is a great loss. The Kalandans were far in advance of the Federation in their technology, and yet they were not destroyed by it, a seeming rarity in the civilizations the Federation has found. The Kalandans could have taught the Federation much; even the world on which the outpost was found was artificial.

The Federation races often use robots for police and for security monitoring. They can be stationery, mobile, even flying; they can carry stunners, netguns, or more daunting armament. They are very effective devices, one of the few applications "robot-looking" robots still have in the Federation. Some races, human included, have used robots for more warlike activities, including the delivery of nuclear warheads. Many other races have apparently had the same idea, but taken it a good deal farther. When the Federation encounters alien robots meant for war, they react with predictable alarm. Not all weapon systems are as primitive as nuclear arms.

The First Federation starship *Fesarius* was almost planetary size, and had the power to hold a heavy cruiser immobile in its tractor grasp. Yet it was so sublimely automated that one small humanoid could operate the entire craft. Starfleet may indeed have had this vessel in mind when they allowed the M-5 experiment.

On some occasions, the use of robotic arms is more bizarre. A peace mission to Eminiar and Vendikar found that the "war" they were sent to settle was a battle solely between computers, the "casualties" willing citizens capable of stepping into a disintegrator booth to prevent the war from becoming a real one. One of the more treacherous encounters was the rediscovery of the earth interstellar probe Nomad. In the course of its mission, it had collided with and combined into an alien probe of great power, becoming a destructive but confused robotic explorer that "sterilized" worlds of their "imperfect" life-forms.

By far the most destructive encounter in space with an alien robot was the discovery of a gigantic robotic ship equipped with an antiproton beam and programmed for the destruction and ingestion of entire planetary systems. It originated outside the Galaxy, most likely, and may well have been intended as a "doomsday weapon", a device of such overwhelming might that it could never be used. This one, it is safe to say, was used, and went looking for other prey. Destroying it cost Starfleet the *USS Constellation* and over 400 crewmen. Yet if it had proceeded towards Orion space and the densely-populated Rigel system, many billions of lives could have been lost. The scope of such destruction, happening over many millenia, staggers even the computer-assisted imagination.

ROBOTS IN STAR TREK: THE ROLE PLAYING GAME

It's impossible to draw limits for robots. The very concept is not perfectly definable. The word "robot" is used to describe moving objects and stationary ones, things that are very smart tools or seem to be rather dense people, or flawless mimics of living beings that are better than the originals. They can be any size, from antlike microminiaturizations to the kilometers-long doomsday weapon. They can fly, hop, roll, walk, even slither. They can be equipped with radar, sonar, infrared vision, an electronic sense of smell or touch. They can obey a prime directive built into them, anything from a need to nurture living beings or creating works of art to a blind urge to murder. If a purpose can be imagined, a need envisioned, a machine can be built to serve it. There are practically no limits to them.

The only limits are ethical. There are some things 23rd Century Federation citizens simply aren't going to find normal. One of these is a machine that acts on its own, without living intervention. There is no way to fully understand what is going on in a robot's mind, and anyone with sense will treat such devices very warily.

The GM who wants to make encounters with robots realistic needs to remember that any robot is inferior to people. The berserker was vulnerable to a nuke in the mouth; the possessive androids of "I, Mudd" had only one coordinator and could not cope with deliberate irrationality. Landru and Nomad were imperfect, according to their own programming, but unaware of it until somebody explained it to them, and then they suicided. Terribly fragile things, robot egos.

GMs should build robots as strong, as smart, as unbeatable as they want. But remember that they will always have a weakness somewhere, an Achilles heel. There should always be something that the players can find out to give them a solution to their robot problems.

All robots, all cybernetic/mechanical tools, are made to serve somebody, answer a purpose, do a thing. Eventually they must answer to somebody for what they do, or have done. This is always true, even if it is nowhere in their programming. They will always be tools, sometimes on a rampage, but always doers of deeds, makers of things, and never the dreamers, the originators of thought. It was Kipling who said that despite the size, and the power and weight of our machines, they are nothing more than the children of our brains. So, remember that, and go on and dream.

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