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REGULA I
SPECIAL ISSUE

RESEARCH STATION

ACTIVE: 2285

GENESIS PROJECT

COMMAND: CAROL MARCUS

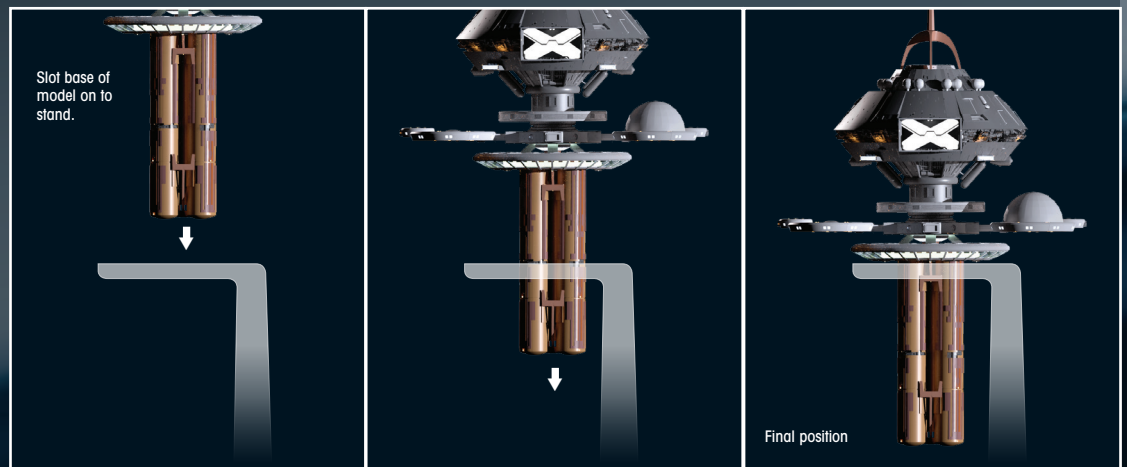
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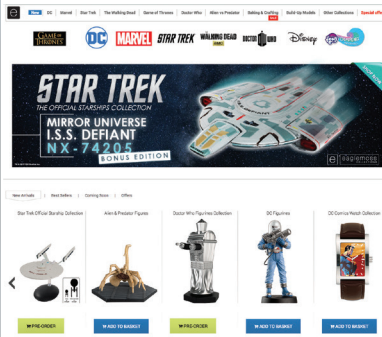
REGULA I



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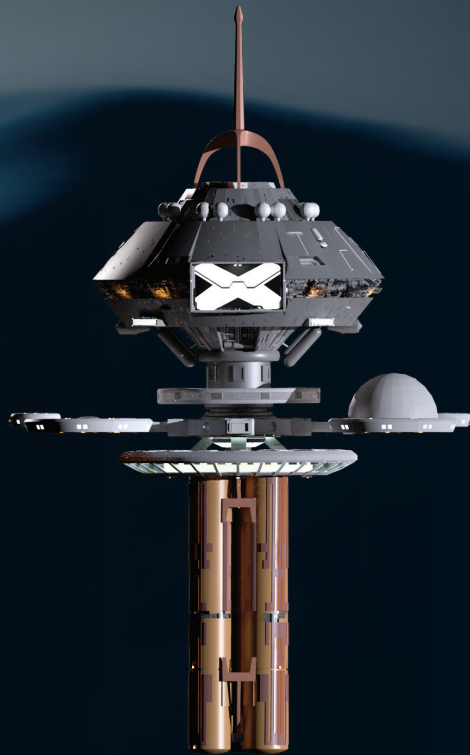
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REGULA I

SPECIFICATION



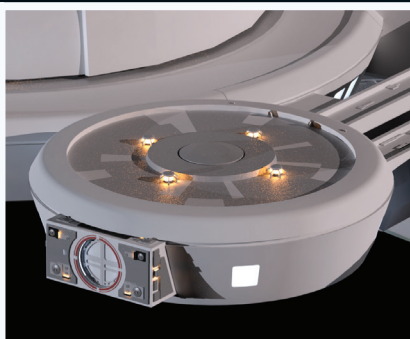
TYPE: SPACE LABORATORY

PROJECT: GENESIS

LOCATION: MUTARA SECTOR

ACTIVE: 22??

COMMAND: DR. CAROL MARCUS





SPACE LABORATORY

REGULA I

This small research facility was used to develop one of the most powerful technologies in Federation history.

The Federation space laboratory

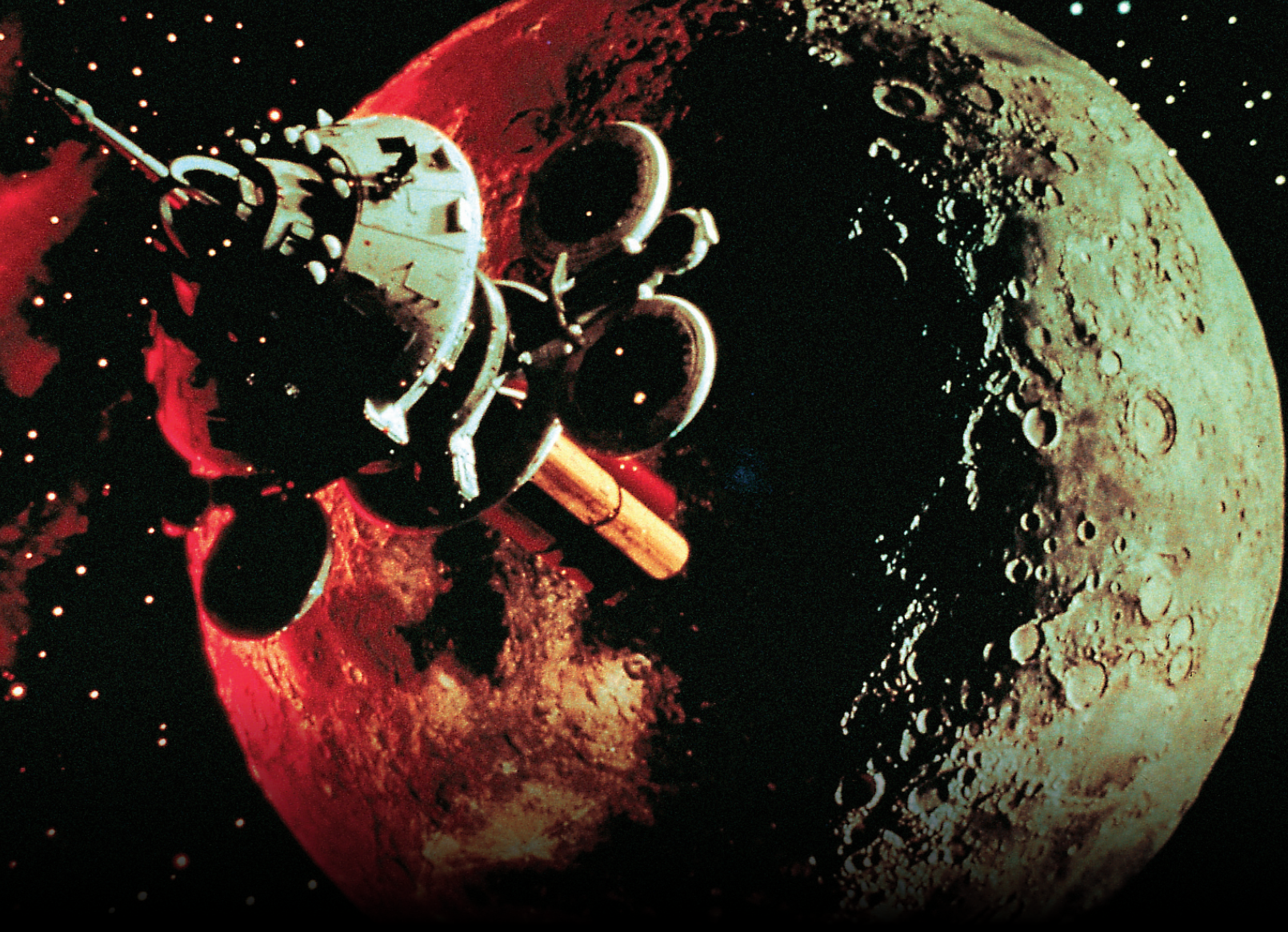
Regula I was an orbital research facility in the Mutara Sector. In the mid 2280s it was put under the command of Dr. Carol Marcus and assigned to Project Genesis, a revolutionary process that could bring life to barren planets in a matter of minutes.

The station was constructed of modular components that were used to build a number of orbital facilities throughout the 23rd and 24th centuries, including *Science Station Tango Sierra* and the research facility at Tanuga IV. The science labs and living quarters were in a circular module at the top of the station, with additional facilities extending horizontally from the core. Transporters allowed the crew to beam down to the Genesis planetoid and the station was

supported by the *Miranda*-class *U.S.S. Reliant*.

Regula I was positioned in orbit around the Genesis planetoid where the initial stages of Project Genesis were tested successfully. The team from *Regula I* terraformed a cave inside the planetoid in a matter of minutes. However, when Khan Noonien Singh hijacked the *Reliant* he discovered the existence of Project Genesis and realized that it could be used as a weapon. Khan took the *Reliant* to *Regula I* and killed most of the crew. Only Dr. Marcus and her adult son, David, managed to escape.

Khan detonated the Genesis device, which resulted in the formation of a new planet. It eventually became apparent that Genesis relied on flawed technology and the project was abandoned.



DESIGNING **REGULA I**

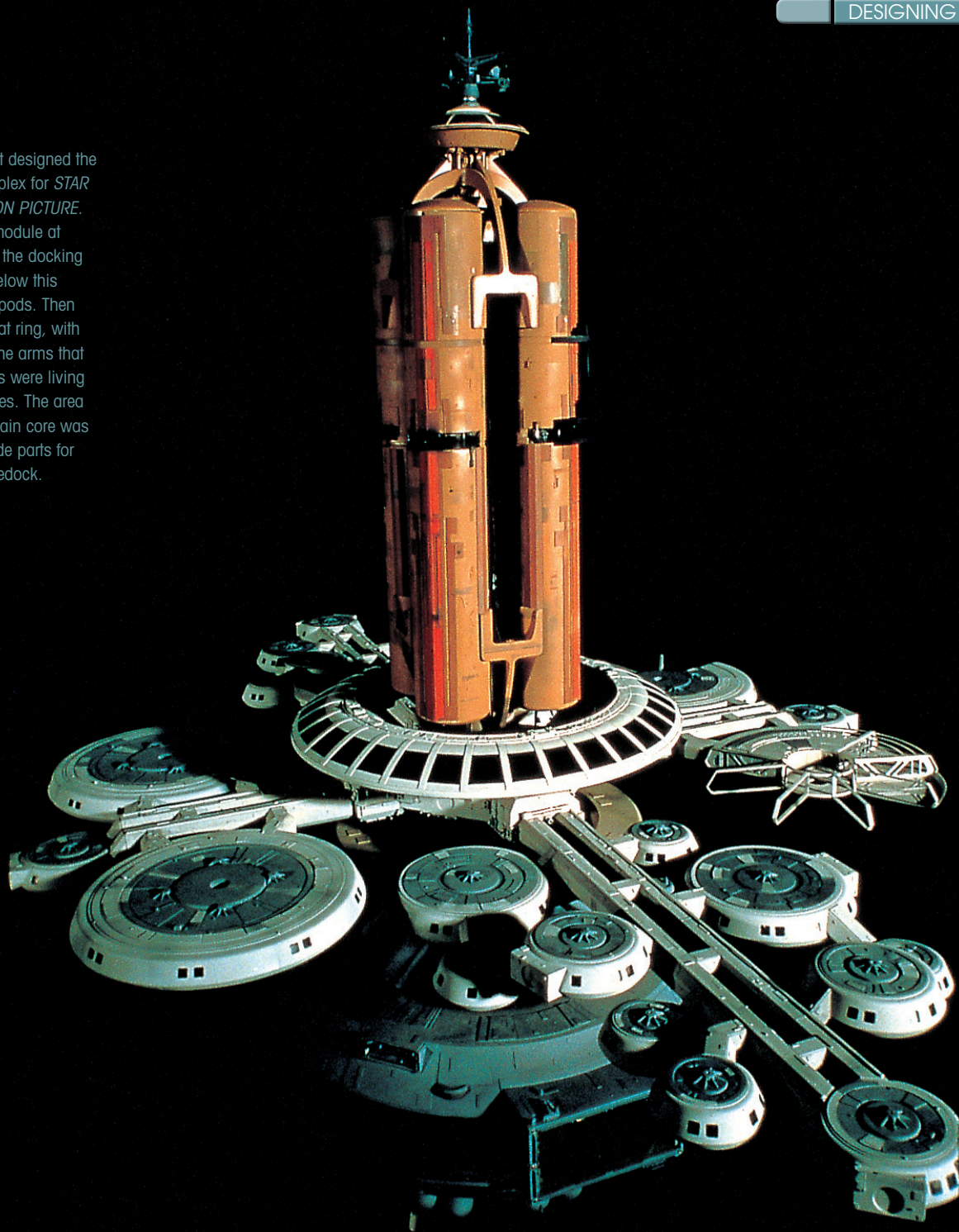
The orbital office complex from the first *STAR TREK* movie was given a new life by making minor changes and turning it upside down.

The design for what would eventually become *Regula I* has its origins in 1978, years before *STAR TREK II* was released. Back then *STAR TREK* was slated to return to TV, and work had begun on a pilot called 'In Thy Image.' The story opened with the *Enterprise* in spacedock in orbit around Earth, as it prepared to leave on Kirk's second five-year mission. We would have seen Earth's San Francisco shipyards with an office complex in the middle. The series' art team, led by

production designer Joe Jennings and art director Mike Minor, had come up with a design that featured a series of dodecahedrons that clustered together to make an unusual building in space.

Then after the success of 'Star Wars,' Paramount decided to upgrade their TV project to a movie and Robert Abel and Associates was hired to produce the effects. Abel's VFX art director, Richard Taylor, wanted to upgrade the design of the orbital office complex, so he handed the

► Andrew Probert designed the orbital office complex for *STAR TREK: THE MOTION PICTURE*. He intended the module at the very top to be the docking control station. Below this were hydroponic pods. Then there was a habitat ring, with large windows. The arms that extended from this were living quarters and offices. The area underneath the main core was a factory that made parts for the ships in spacedock.

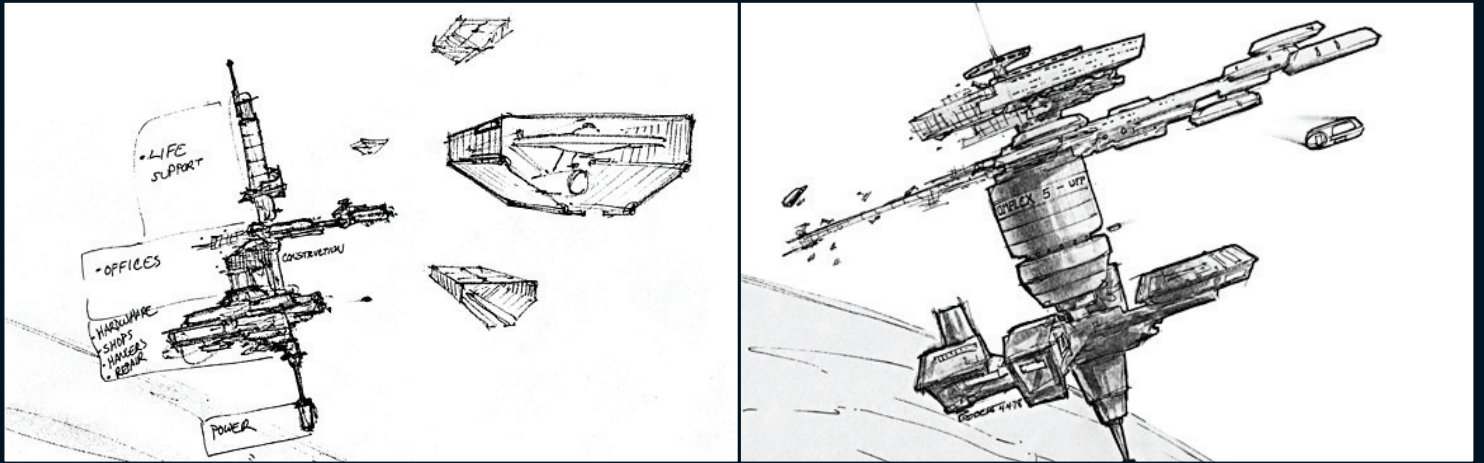


design to a young illustrator called Andy Probert and told him to come up with something that looked multi-layered and complex.

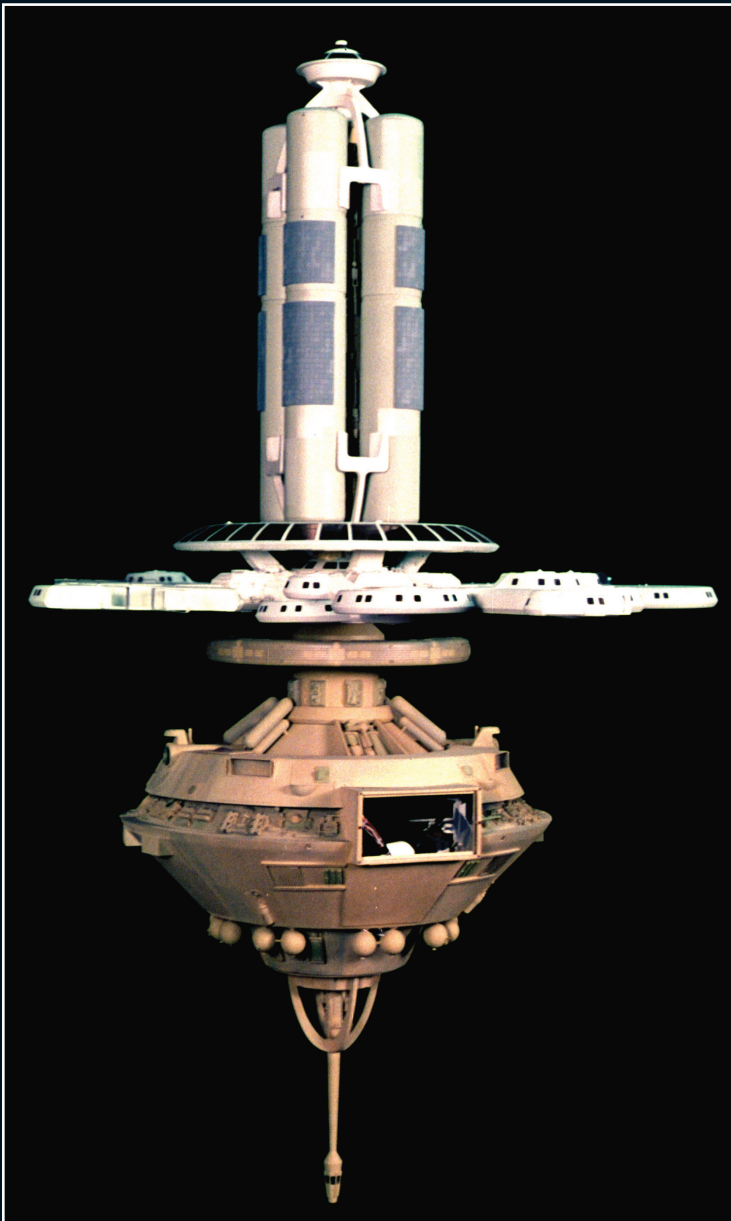
As Probert recalls, he set about designing an entire orbital shipyard complex, "It was always my hope that you would see more than one drydock in the scene, indicating a large orbital shipyard, with the office complex in the center."

Probert always went to great trouble to think through the logic of everything he was designing,

and he theorized that in addition to the spacedocks and the administrative center, the shipyards would need a factory where parts were made and somewhere for the staff to live as well as work. "I finally hit on the idea that the offices would be combined with the orbiting factory, which would manufacture parts for the ships as needed, so at the bottom of the complex you'd have a factory, and below that you'd have a power source."



▲ A selection of Andy Probert's early designs for the orbital office complex, which would have been surrounded by ships in spacedock. He originally wanted the station to be 'taller' and to have a power plant at the bottom, but this was eliminated during the design process.



▲ The model of the orbital office complex under construction at Magicam in 1978 before its appearance in *STAR TREK: THE MOTION PICTURE*.



Probert placed a habitat module at the center of his design and then balanced the proportions by designing a series of large tanks that extended above this. "At the very top of the structure was dockyard control. Then the vertical tanks below that are hydroponic gardens, which would supply a lot of the food and oxygen to the station. There's a ring at the base of those with windows in. That was a recreation space that would have gardens and open areas – various spaces where the crew could come together and enjoy large vistas into space. Below that you'd have a series of pods that go out horizontally. The offices are on very long extensions, and the residential areas on the short extensions. When you see it in the movie, they're continuing to build part of it – that's a residential pod." As the design evolved, the VFX team eliminated the bottom part of Probert's design but otherwise the model was constructed much as he designed it.

When ILM took over the effects work for *STAR TREK II*, they decided that they could re-purpose the orbital office complex to become *Regula I*, the station where Carol Marcus was developing the Genesis Device. As Steve Gawley remembers, "We were given the task of making it look different. We took it apart and put it upside down and then reattached some of the outer pods in a different way." ILM also added an antenna to what was

now the top of the station, removed the office pods and added an observatory dome to one of the habitat pods.

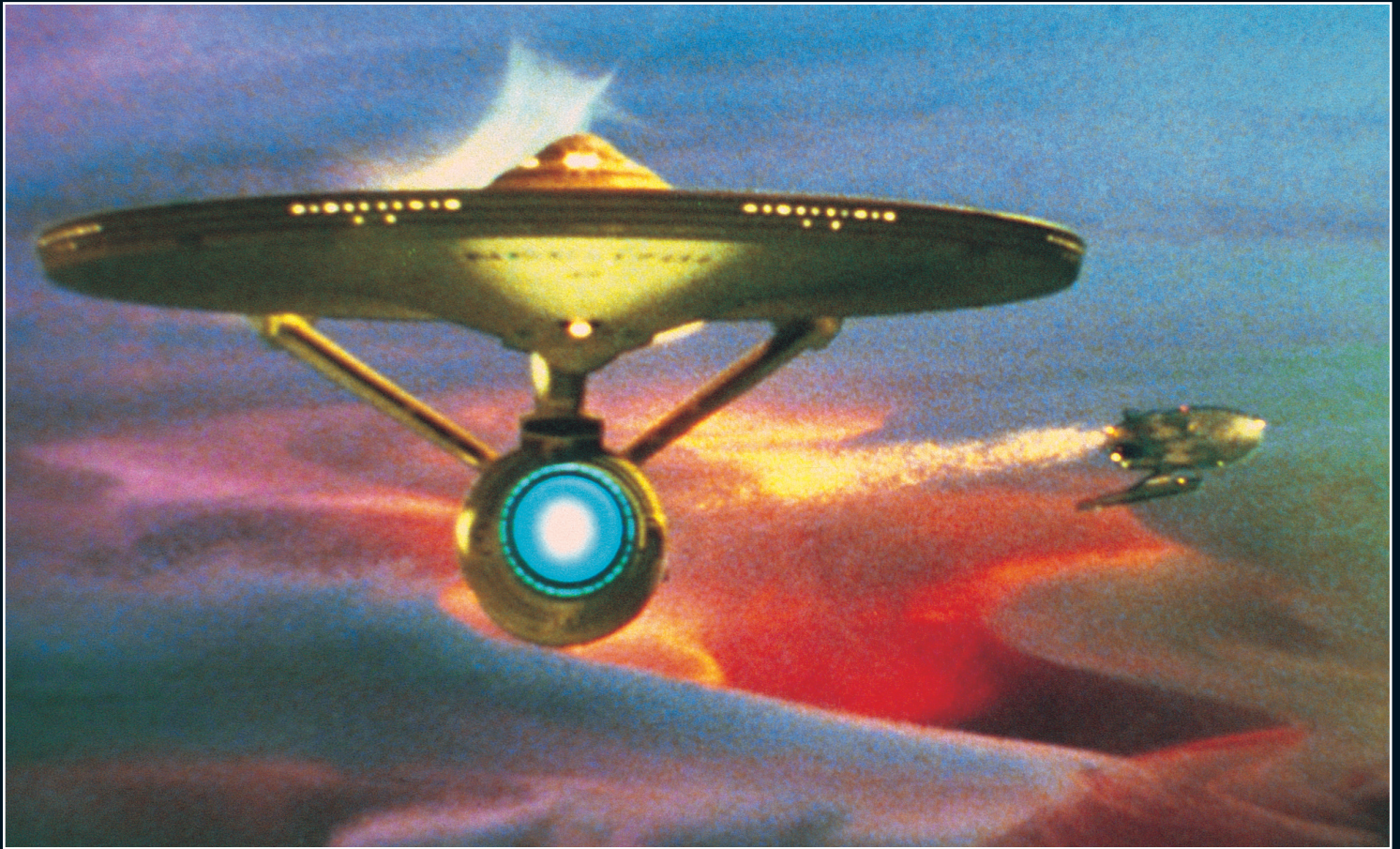
ILM also added an animated sequence of lights to the hangar bay. As Marty Brenneis explains, "They wanted these animated lights that run in a sequence across the top of the bay. I made modifications to the system so that the camera could 'talk' to the model. That was the first time I ever did that but after that it became a standard thing."

By the time they were done, the office complex had been completely reborn and, appropriately, given a new lease of life as the home of the Genesis Project.

▲ This piece of Tom Lay concept art shows *Regula I* in orbit around the Genesis Planetoid. Note the nebula in the background.

▼ The ILM team adapted the model for its appearance in *STAR TREK II* – turning it upside down and upgrading the lighting.





STAR TREK II

VISUAL EFFECTS

The effects for *STAR TREK II* had to be produced on a tight budget, but they still involved revolutionary techniques that changed the industry forever.

When Paramount Pictures greenlit a sequel to *STAR TREK: THE MOTION PICTURE*, they insisted that the effects come in on budget. On the first *STAR TREK* picture they had become a nightmare that had pulled in half the VFX artists in Hollywood and cost much more than planned. At the same time, the bar for visual effects was higher than it had ever been before and any new sci-fi film was expected to deliver, regardless of budget. To ensure this would be the case, producer Harve Bennet turned to long-time friend Robert Sallin, who had directed

over 1,000 TV commercials, many of which featured visual effects. His remit was to handle the practical side of the sequel, now known as *STAR TREK: THE WRATH OF KHAN*.

The decision was taken to award the commission to Industrial Light And Magic (ILM), known at the time for their ground-breaking work on founder George Lucas' 'Star Wars' movies. *THE WRATH OF KHAN* would mark ILM's first production in which Lucas would have no involvement. Sallin was delighted to have them on board. "They were incredible," he recalls. "The most professional, the



◀ The model of the *U.S.S. Enterprise* that Magicam built for *STAR TREK: THE MOTION PICTURE* was far larger than the models ILM was used to, and they found it difficult to work with.

most delightful, the most responsive. I couldn't say enough good things about the whole crew."

Advised of the film's tight budget, ILM wasted no time appointing two supervisors – Ken Ralston and Jim Veilleux. Veilleux, who had an interest in computer graphics, worked alongside Alvy Ray Smith and the LucasFilm Graphics Group on the demo tape that detailed the effects for the Genesis device, the starfields, matte paintings, split screen work and the final explosion which created the Genesis planet, while Ralston handled the rest.

"I took the cool stuff!" laughs Ralston. "I wound up doing a lot of the action stuff; all the confrontations between the *Reliant* and the *Enterprise*, and the nebula chase at the end."

Working alongside Veilleux and Sallin, Ralston produced detailed storyboards listing special and optical effects. According to Sallin, this was the key to preventing the budget from spiraling out of control. Sallin also conducted a detailed inventory of models left over from TMP, in particular identifying any which could be de-rigged and reused for the new movies. While this had obvious

budgetary advantages, it caused some problems for ILM. The model of the *Enterprise* originally constructed by Magicam proved particularly problematic. "We found ourselves presented with a model which I believe had an overall length of maybe ten feet or more," recalls ILM model maker, Steve Gawley. "Not only was it enormous, it was

▼ ILM didn't want to damage the model of the *Enterprise* so they built a small section of it that could show the damage inflicted by Khan's phasers.





▲ ILM built a completely new model for the *Reliant* that was designed for the way they filmed. It went on to become one of the most reused models in *STAR TREK*'s history.

also extremely heavy and difficult to maneuver. It took maybe eight or nine people just to lift it and it could only be held by the center area. Every time it had to be moved there was a fear it would be dropped and damaged beyond repair."

As well as reusing the model, the ILM team were able to reuse shots from the first *STAR TREK* movie, including a shortened version of the launch sequence when the *Enterprise* leaves Earth and shots of it going to warp.

Another model earmarked by Sallin for reuse was the orbital office complex. Sallin suggested that with certain adjustments it could be modified to become the scientific research laboratory *Regula I*. "Basically, we needed to make it look as different as possible, so anyone looking at it wouldn't immediately recognize it as the orbital office complex," Gawley recalls. "But, at the same time, it also needed to look like a research lab."

Not everything could be re-purposed from *THE MOTION PICTURE*. Certain models such as the *Regula* planetoid and various smaller structures had to be built from scratch. However, for ILM, the biggest undertaking was the construction of the

U.S.S. Reliant – the first new Federation starship to appear on screen since the *Enterprise* itself.

The task of designing the ship fell to Joe Jennings, Mike Minor and graphic designer, Lee Cole – part of Paramount's art department. Although in the script the ship was described as 'an older cruiser of *Enterprise*'s own class', it was decided that, to avoid confusion during the battle sequences the two ships should look different from one another. This was good news for ILM as it meant the problems presented by the cumbersome *Enterprise* model could be avoided. "Right off the bat we decided not to build it to the same size specification as the *Enterprise*," recalls Gawley. "And that was because we knew we could obtain a pretty good level of detail on a smaller model and that we could then fit it with internal lighting that was built up here for us and to our specifications."

As part of their 'different as possible' remit, the Paramount design team had also altered the usual color scheme. Something which did not sit well with the ILM team. "They'd come up with a totally



new color scheme for the ship's markings, thinking that would make it look different," recalls model maker, Bill George. "They were done in a sort of yellow and green checkerboard. When I got them I thought, 'This can't happen.' When I showed them to Ken Ralston he felt the same. His take on it was, 'Let's put on the Federation graphics that we know have been used before and see what they say.' Thankfully, the producers were happy with that."

WAX STARSHIP

When the two ships first meet the script called for the *Reliant* to fire its phasers at the *Enterprise's* neck and cut an enormous gash. Ralston was able to achieve this by using the stop animation techniques pioneered by legendary Ray Harryhausen "I had that section done as a wax piece and then painted it to look like the ship," Ralston explains. "Obviously, we worked out exactly how the camera was going to move. Then I just went into the wax version, and I would take little sculpting tools and rip stuff up and bend it around. We'd film that, then the camera would move whatever distance it would cover in one frame, and I'd sculpt some more damage. Then, on top of that, we did some animation of a laser hit sort of cutting into it, but it left a real cut – a big scar – which I thought was kind of cool."

Meanwhile Veilleux's team were responsible for filming any bluescreen work involving actors. The scene where Terrell shoots himself was filmed in two stages. Firstly, with Terrell in place and playing out the scene. Then a second time without the actor. In post-production the two pieces of film were effectively layered on top of one another. ILM animator Kim Knowlton then created a disintegration effect which removed Terrell from the frame, leaving the background exactly as it had been filmed on the stage. Similar techniques were used to combine the small portion of the Genesis cave that was built on the sound stage with the matte paintings that Chris Evans and Frank Ordaz created at ILM. As was traditional, the matte was painted on glass, with a portion left on one side.

In a memorable but stomach churning scene, Khan puts a Ceti eel into the ears of both Terrell and Chekov. Later in the film we see one crawl out

▲ Storyboard art details the stages of the sequence where Terrell turns his phaser on himself and commits suicide, completely vaporising himself.

► Most of the Genesis cave was created using a matte painting made by ILM's Chris Evans. The moving water effects were created using cotton behind a glass layer to create a sense of motion.



▼ Only this small part of the cave was actually a physical set on the Paramount lot. It was added to Evans's matte painting using an optical compositor that filmed the two elements together.



of Chekov's ear, leaving a bloody trail behind it. To create the effect, a giant model of actor, Walter Koenig's ear was built along with models of the eel itself. Fake blood was added to several of the shots for added gore. The effect was so realistic that a shot featuring the model of Chekov's ear had to be removed from the finished film when test audiences were visibly revolted by it.

With both the *Enterprise* and *Reliant* models sorted, attention turned to the background against which the ships would be filmed, which would give the illusion of a ship moving through star laden space. Historically, this effect had been achieved by piercing holes through a black piece of card,

placing it in front of a strong light and filming the result. Jim Veilleux was keen to find an alternative. A computer company called Evans & Sutherland based in Salt Lake City Utah provided one. They had designed a system called Digistar 1, which was being used in planetariums. "It could show a dynamic camera move through an enormous database of stars." Explains effects director of photography Scott Farrar. "It was, in essence, a graphic recording of all the stars and their positions known to mankind as recorded from Earth and input into this system. It was great because, once you had all the stars, you could project things. Because you can only see to a certain point, in essence, you came up with a sphere. You could take a camera and fly from one side of the sphere to the other. That's how we constructed our camera moves, and we had three-dimensional views of stars that we could put in behind the ships. That certainly gave us a unique look."

Working with Veilleux and his team, Evans & Sutherland programmers were able to adapt their system to work like a motion control camera, with impressive results. By using a joystick the team could create any move they wanted and, because the system was computerized, the moves could be repeated perfectly. The resulting film of the stars could then be combined with the

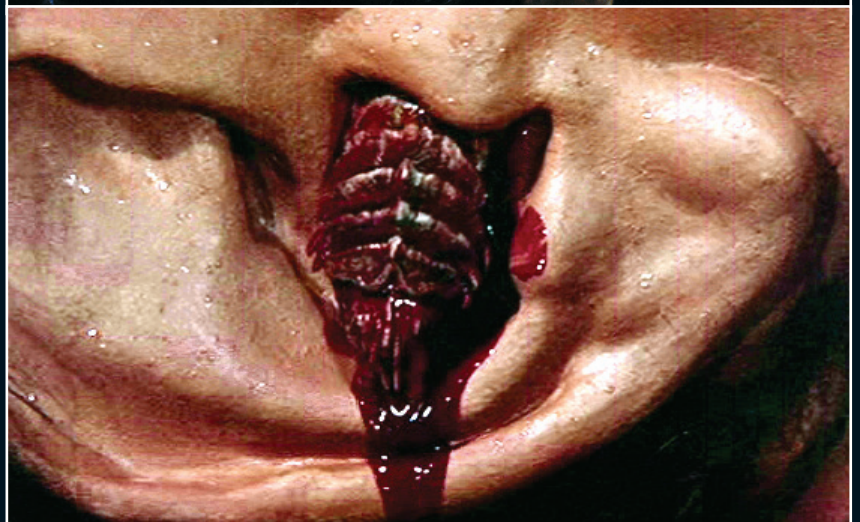
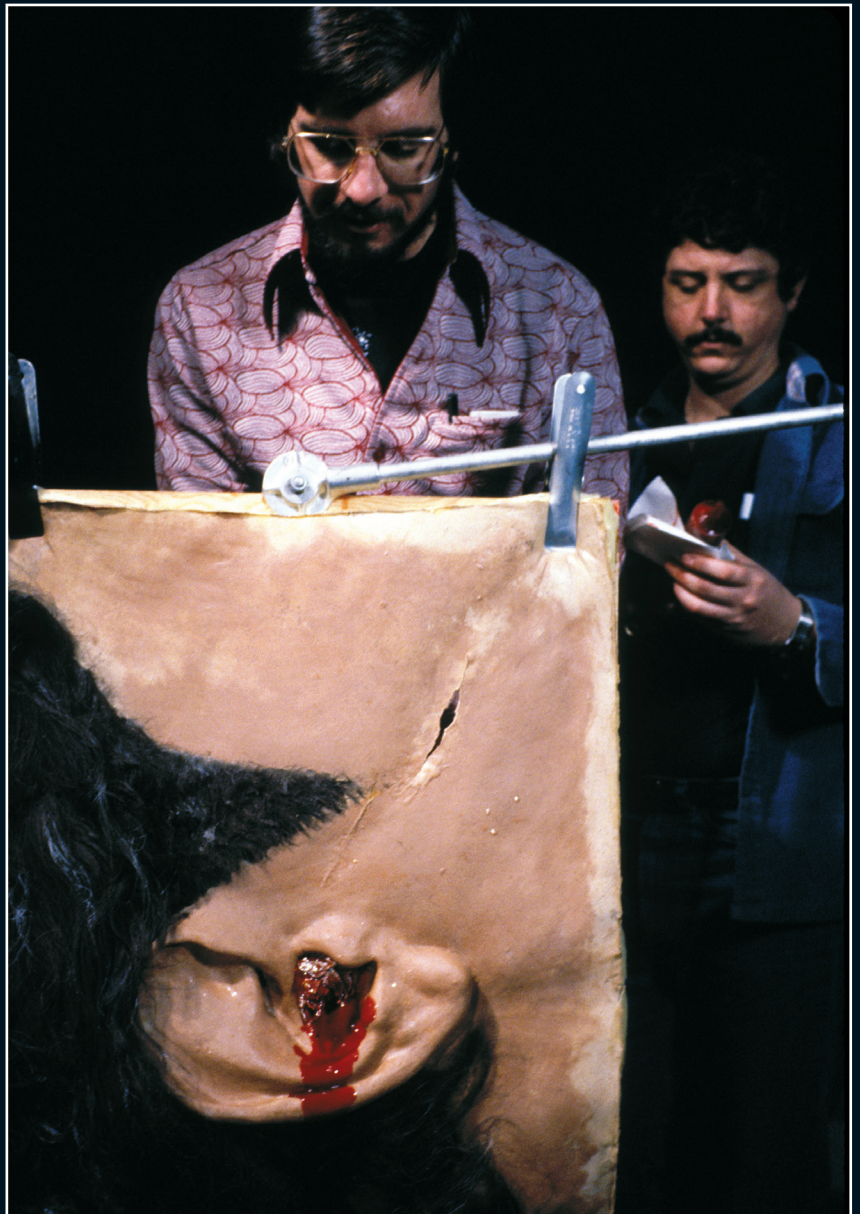
footage of the models that was shot at ILM. The technique was so successful that Sallin decided to adopt it for the opening titles, abandoning the sequence he had originally storyboarded.

FINAL BATTLE

Filming the battle between the two ships in the Mutara Nebula proved to be a lot more complicated. Before the actual sequence could be worked out Ralston and his team had to decide what a nebula would actually look like. "There were all these storyboards," recalls Ralston. "Then we just started getting research material. 'What do nebulas look like?' We looked at the real nebula stuff, but we were all more interested in doing something more fun and more *STAR TREK*, which really wasn't that high-tech, in a weird way. I believe Mike did some color concept art for a starting point, and then I just came up with this thing using a cloud tank. It had a look to it that just lent itself to *STAR TREK*."

Ralston's cloud tank consisted of a large container filled with colored liquid. "It was probably five or six feet deep by eight to 10 feet wide," says Ralston. "I used this weird concoction of some kind of liquid rubber material mixed with white cartoon paint. It took a lot of care. If I remember this right, you'd put in a layer of saltwater, lay a plastic sheet on the top of it, and then you'd put in a layer of just regular water. You would very gently remove the sheet, and the salt would keep an inversion layer where the two met so they wouldn't mix, and that would give you some interesting ways to play with what you did with the rubber. I had these long – for lack of a better description – turkey basters, and to make it more interesting you churn the layers around a little bit to create these different shapes."

The final effect of swirling color was created with lights and depended on Ralston's ability to think quickly. "We had lights set up everywhere for anyone to grab, because I never knew where to place them, and we would have the gels lying around. I'd have to make a quick guess, based on how fast my material was moving. I had an army of people and, as soon as I started to get some weird shapes forming, I would start yelling what colors to throw on and what light to move where. Suddenly,



▲ The Ceti Alpha eel that crawls out of Chekov's ear was a puppet that Steve Gawley pushed through a giant replica of Walter Koenig's ear. The shots showing the lava crawling over Chekov's face were made with a small piece of foam that was pulled along by a piece of fishing wire.

► The Mutara Nebula was made using a cloud tank, which creates cloud like shapes that are suspended in water. It can be lit from behind to give it color.



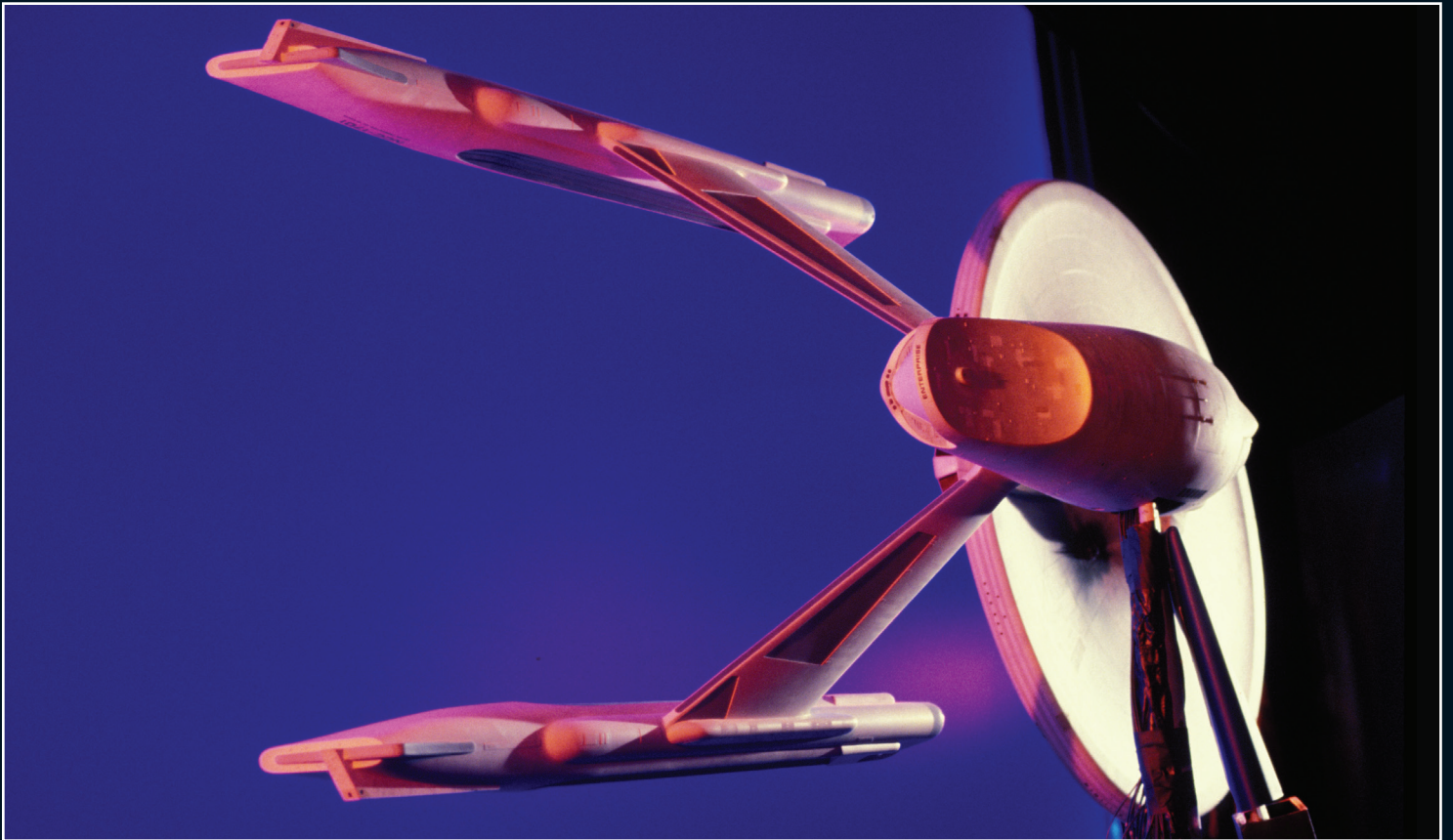
you'd yell, 'That's great; get it out of the way!' Then we would basically shoot as many takes as we could on these things before it turned to mush. "Sometimes that would happen within ten minutes. Other times you'd have half-an-hour, depending on what you were doing. Every day was different, everything seemed to affect it! We thought the

phases of the moon affected it, because we had no explanation why it would be so different each day." Ralston was also able to create flashes of light like lightning that shot through the cloud

Once the nebula had been filmed, Ralston turned his attention to the starships that would be moving around inside it. Staging the battle was

► This piece of Tom Lay concept art shows the Reliant entering the nebula, where the interference will reduce Khan's tactical advantages.





one of the biggest challenges faced by ILM. Because the ships were often in the distance, he was able to use small versions of the models that were specially constructed by the model shop. These were much easier to handle than the full-size models and could perform bigger maneuvers.

The script called for the ships to inflict serious damage on one another, but there was no way they could actually damage the models, which had to remain intact. "On the *Enterprise* that didn't present a great problem as the damage was essentially cosmetic," recalls Ralston. "We added on pieces of adhesive-backed aluminum and then painted those areas so that, where need be, we could literally peel off the damage. The damage to the *Reliant* was much more serious, so the model shop built larger versions of different parts of the ship that they could happily destroy. The final battle ended with Kirk blowing up a dome toward the rear of the *Reliant*.

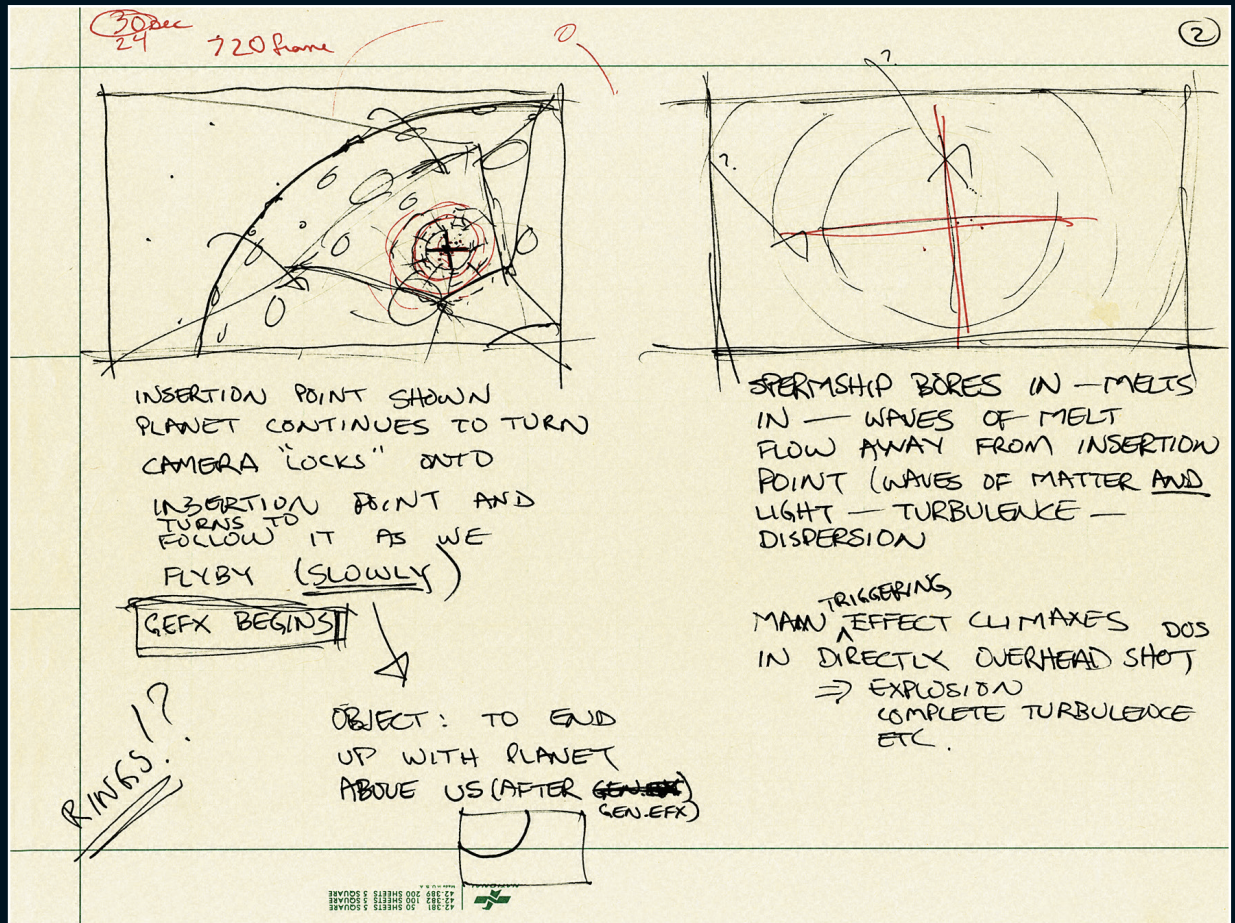
"One of the engine pods blows up too," Ralston remembers. "We couldn't blow up the whole pod for some reason, so I built a shape similar to it and it was more like glass blowing out of the warp nacelle. We shot that as a separate element and

then printed that on top of the actual model of the *Reliant*, with other pieces blowing off of it. Then, when the whole nacelle blows off, that was just a bunch of explosions and a separate arm that we shot using motion control."

Visual Concept Engineering, a small effects house was brought in to provide addition effects such as phaser beams, the sandstorm on Ceti Alpha V and the *Enterprise* reactor but most importantly matte work for a new and improved transporter effect. Director Nicholas Meyer had been keen to move away from freeze frame effect used in the original *STAR TREK* TV show and have scenes with characters conducting conversation mid transport.

While Evans and Sutherland had broken new ground with their computer-generated star system, ILM went one step further by opting to use CGI to show the effects of the Genesis Device on a barren planet. ILM had initially used animation to demonstrate the effect of a rock changing into a flower. When Paramount demanded something more spectacular, Veilleux enlisted the services of the LucasFilms Computer Group to produce a sixty-second sequence effect. They introduced a

▲ The VFX team shot the *Enterprise* with colored light to make it look as if it was inside the nebula.



► Alvy Ray Smith's original hand-drawn storyboards for the Genesis Effect. At the time most of the techniques used to create computer-generated imagery were still being invented and only a handful of people knew what they could be used for.

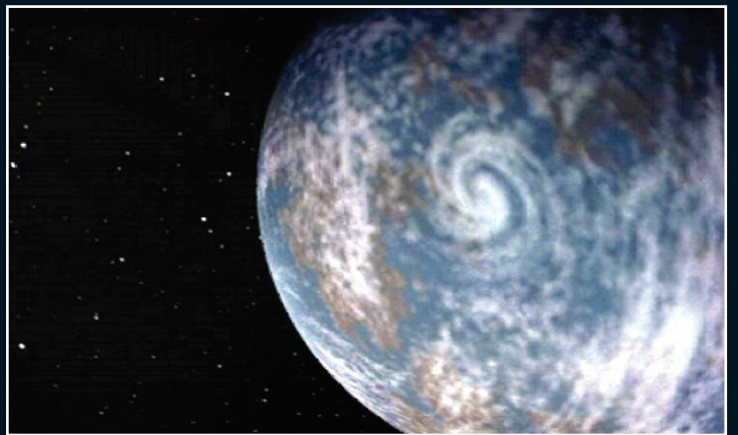
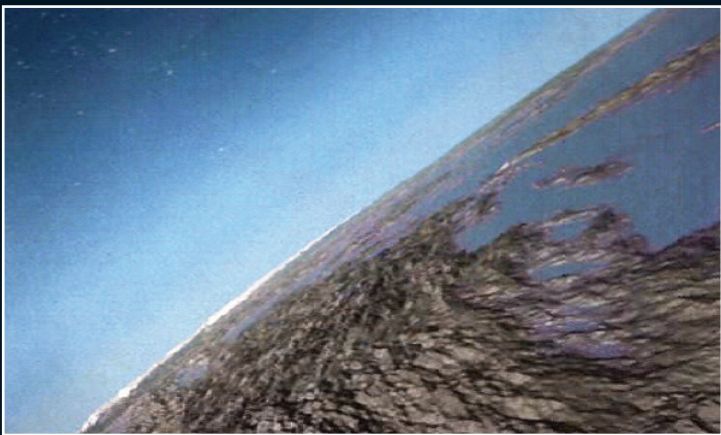
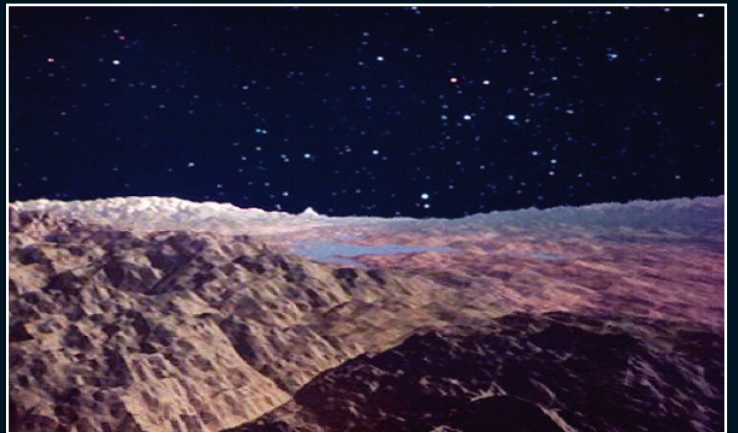
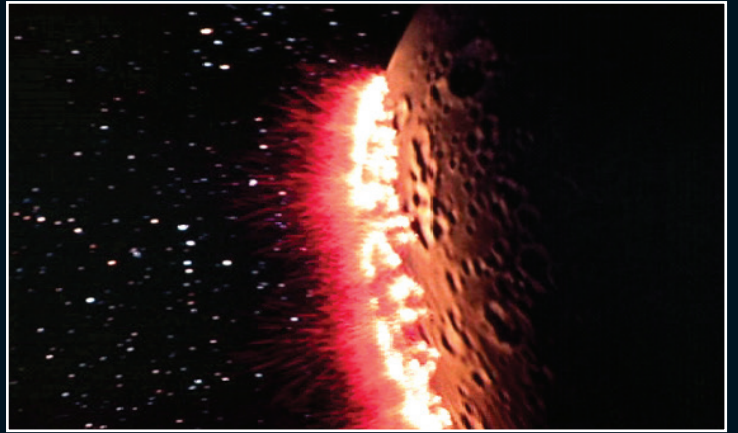
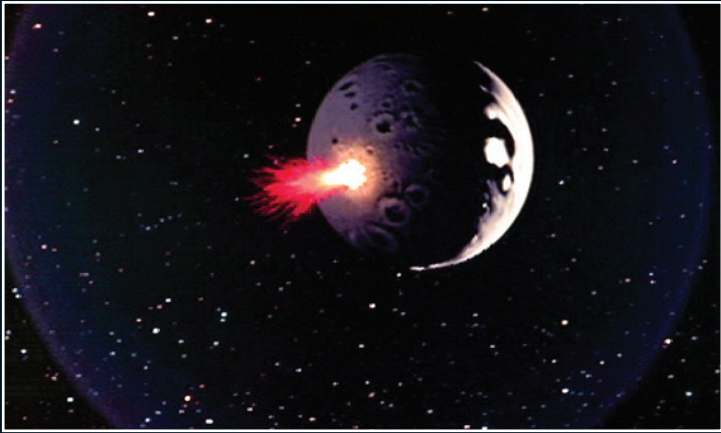
raft of new techniques including particle systems, a combination of two dimensional bitmaps, 3D models and other graphics to simulate natural phenomena, or in the case of *THE WRATH OF KHAN*, a chemical reaction. It would be the very first time such a process would be used in a motion picture.

The final shot in the nebula, when the Genesis Device is activated by Khan and generates an enormous explosion which creates a new planet, was handled by Veilleux and his team. "To do the explosions at the end, we went to the Cow Palace," recalls effects director of photographer, Scott Farrar. "It was a venue in the south San Francisco area which was basically an indoor stadium with a very high ceiling and supported without pillars or posts on the inside. The typical space explosion is an anti-gravity effect. The only way to do that is to explode your pyro compounds directly over a camera, so you're looking straight up at the explosion. When it explodes you don't get a sense of gravity because it's all dropping towards you. All those wonderful little burning bits

that everybody loves go flying past camera, and you get this wonderful anti-gravitational interstellar explosion. You never know what you're going to get, because you shoot it at very high speed, so you can slow the explosion down to make it look really majestic."

Having hit their deadline on budget, ILM were called on to provide one final shot - Spock's coffin lying on the Genesis Planet. "That was a last-minute decision by the studio," says Ralston. "With very little time to play with, we went to the Golden Gate Park, based on a quick location scout I'd done. We had the coffin out there and smoke machines and all that stuff, and created this rather lyrical, nice moment."

That final shot was dropped into the final version of the movie, where it offered the audience the hope that somehow Spock might be reborn. The movie was delivered on time and on budget, paving the way for a dozen sequels. ILM became the *STAR TREK* movies' effects provider of choice, a relationship that would last well into the 21st century.



STAR TREK™

