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SPACEDOCK

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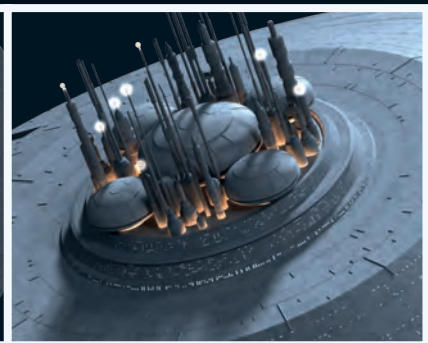
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SPACEDOCK

SPECIFICATION



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| CLASS: | SPACEDOCK-TYPE |
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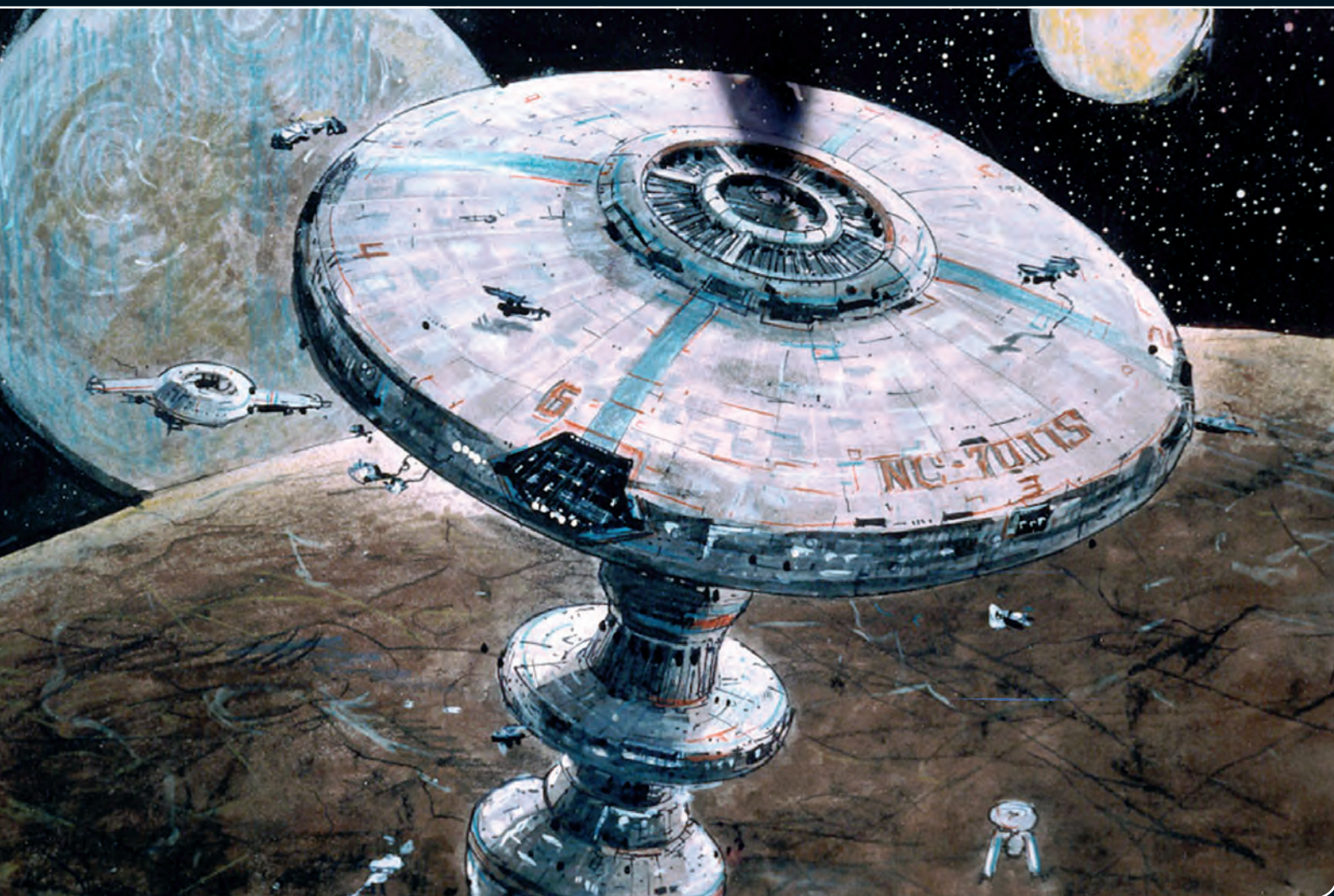


SPACEDOCK

High above Earth, the sight of Spacedock's opening doors marked the start and end of many a Starfleet mission.



A vast orbital platform visible from the planet below, Spacedock is the most impressive of the various Starfleet facilities circling Earth. Its mushroom-shaped upper section is an enormous sheltered dock for starships up to *Excelsior*-class size. At the center of this giant space, and extending far below it are hundreds of decks comprising a whole vertical city, as well as secondary docking bays for smaller vessels. The *U.S.S. Enterprise* NCC-1701 made its final journey from Spacedock during 2285, while its successor ship, the *U.S.S. Enterprise* NCC-1701-A, launched from the station the following year.



HOW TO MAKE A

VINTAGE PORT

Introduced in *STAR TREK III*, Earth's vast orbital Spacedock became an instant fan favorite that would feature in four big-screen adventures.

The original run of *STAR TREK* never journeyed to 23rd-century Earth. It was not until 1979's *THE MOTION PICTURE* that we got a first brief glimpse of Starfleet Headquarters in San Francisco, along with a small office complex and a nearby drydock, both in orbit of the planet. These two orbital facilities were designed by Andrew

Probert, and both were reused in *STAR TREK II: THE WRATH OF KHAN* – though this time with the office complex turned upside-down to serve as the Regula I space station.

For *STAR TREK III: THE SEARCH FOR SPOCK*, the story returned to Earth once more, as the *Enterprise* came home to be decommissioned,

▲ Early ILM concept art shows Spacedock in orbit of the moon, with Earth in the background, and a non-standard registry number of NC-7011S.

before being stolen by Admiral Kirk and his old command crew. With both of these sequences offering plenty of scope for drama and action, and with the earlier office model now firmly established in viewers' minds as Regula I, the film called for a new orbital space station – one where ships could dock directly with the habitable work and recreation areas.

First described as “new space dock” in a handwritten note on writer/producer Harve Bennett’s third revision of the story outline from December 1982, the design that would become Earth’s new orbital hub originated with David Carson in an early production meeting. Along with Nilo Rodis-Jamero, Carson served as visual effects art director on the film, and was employed by Industrial Light & Magic (ILM). The visual effects company had formed a good working partnership with Paramount Pictures during the making of *THE WRATH OF KHAN*, and so, for its follow-up, their team of designers was involved from the very earliest concept stages.

“I was trying to think of all the different ways you might build a space station,” Carson said, recalling this planning stage. “And I thought: What if it was so big the *Enterprise* actually went inside it? I did a drawing of a space station that was that big. It was a bit clunky, but Nilo took it and – in his typical fashion – turned it into a really wonderful design. So we presented this idea,

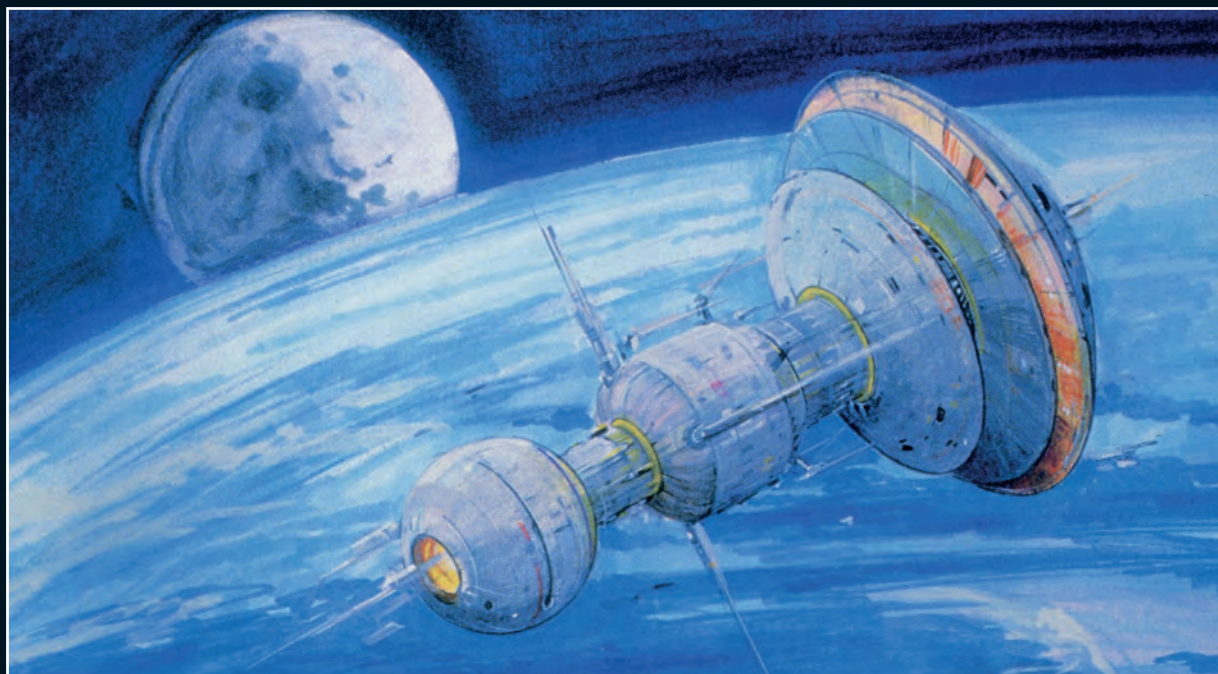


◀ The office complex orbiting Earth in *STAR TREK: THE MOTION PICTURE* (left), and the U.S.S. *Enterprise* as it prepares to leave drydock in the same film (below).

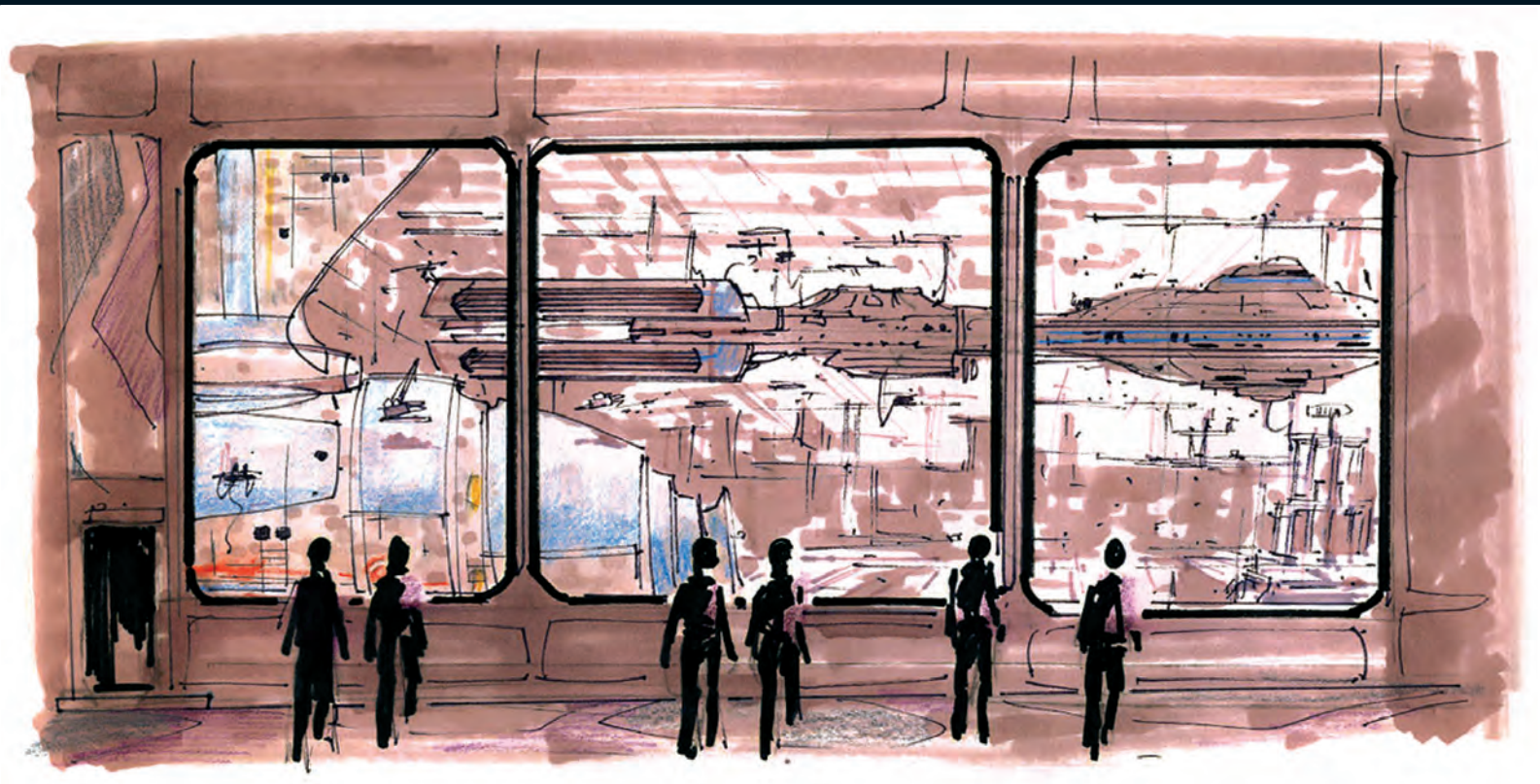


and that led to Harve coming up with the idea of them trying to back the *Enterprise* out through the doors at the very last minute.”

Carson was struck by the challenge of making the station look suitably vast next to the *Enterprise*, rather than simply making the ship look small by comparison. With this in mind, he also pitched the idea that relative human scale could be conveyed by means of an interior window.



◀ In this concept painting, Spacedock has echoes of a 20th-century satellite, as per ILM’s efforts to keep their *STAR TREK* work more rooted in reality than their equivalent effects for *Star Wars*.



▲ David Carson's concept sketch for an airport-style lounge inside Spacedock shows a possible design direction for the *U.S.S. Excelsior* visible through huge internal windows.

"We had been flying down to Los Angeles fairly often to have meetings with (Paramount)," he explained. "When we got off the plane at the airport, we would see the plane we had just gotten off, through the window. So I did a drawing of this space station where you look through the window and you see the *Enterprise* sitting out there."

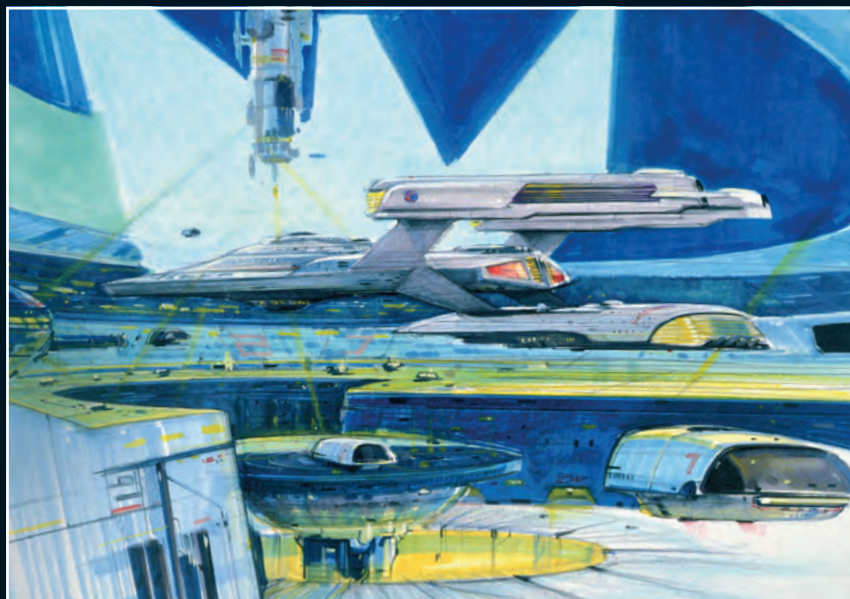
Rodis-Jamero addressed the question of scale, too, as he fleshed out the interior concepts. "What I remember laboring over was the beams of light

that spatially defined the interior," he said. "As there was no architectural detail, you needed an element that defined how big it was. The only way to do that was with beams of light – to give you distance and some kind of perspective."

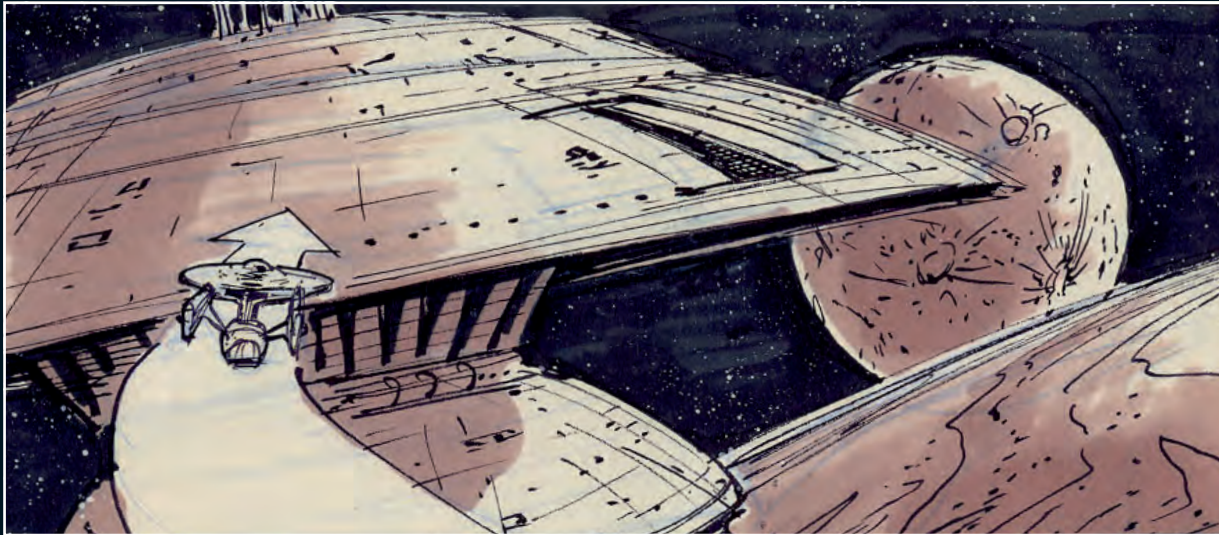
OUTSIDE POSSIBILITIES

As the design developed, Carson worked on storyboards showing how the *Enterprise* would enter the rotating station, and modelmaker Bill George assembled the first three-dimensional studies of what was now being referred to as Spacedock, under the guidance of supervising modelmaker Steve Gawley.

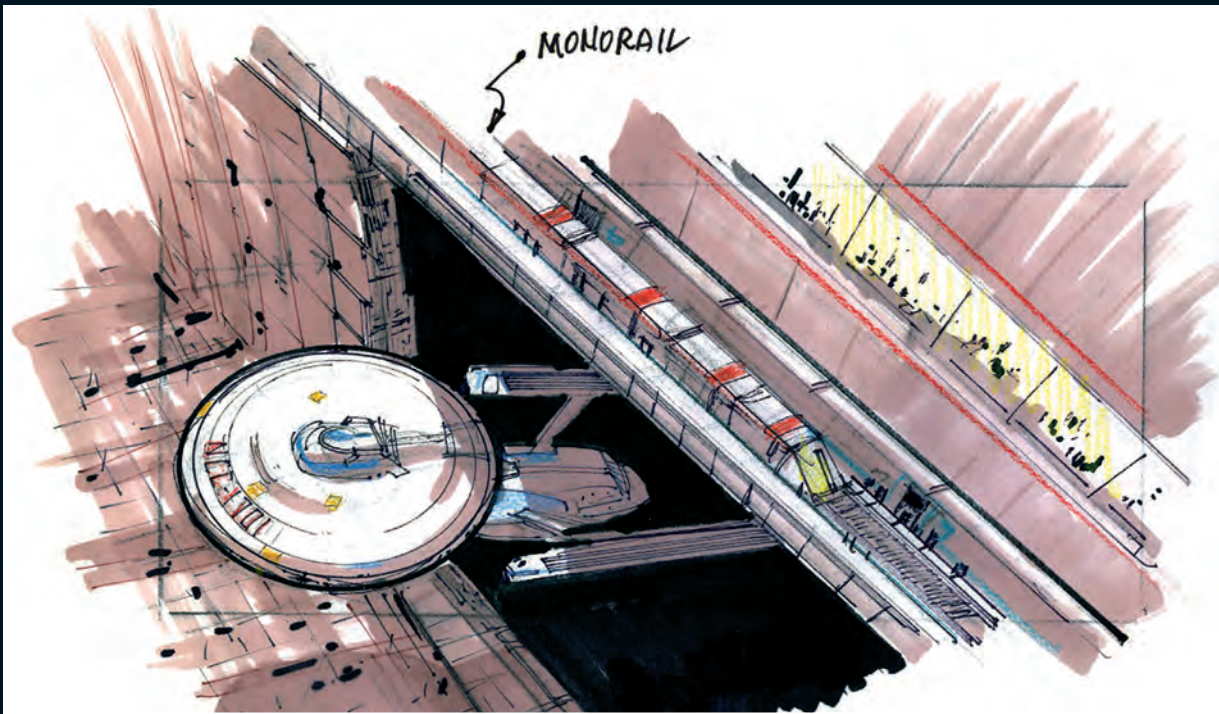
"Bill was really talented at throwing designs together," Gawley recalled. "With Spacedock, there were four or five study models, and it really helped to walk around them in 3D. Drawings are vital in the process, but sometimes, with drawings, lines are put down that don't work in real life. With models sitting on a table, the director can really get a feel for what we're talking about. The one we finalized was about a foot long from tip to tip, and used the parts that were liked from two or three of the others."



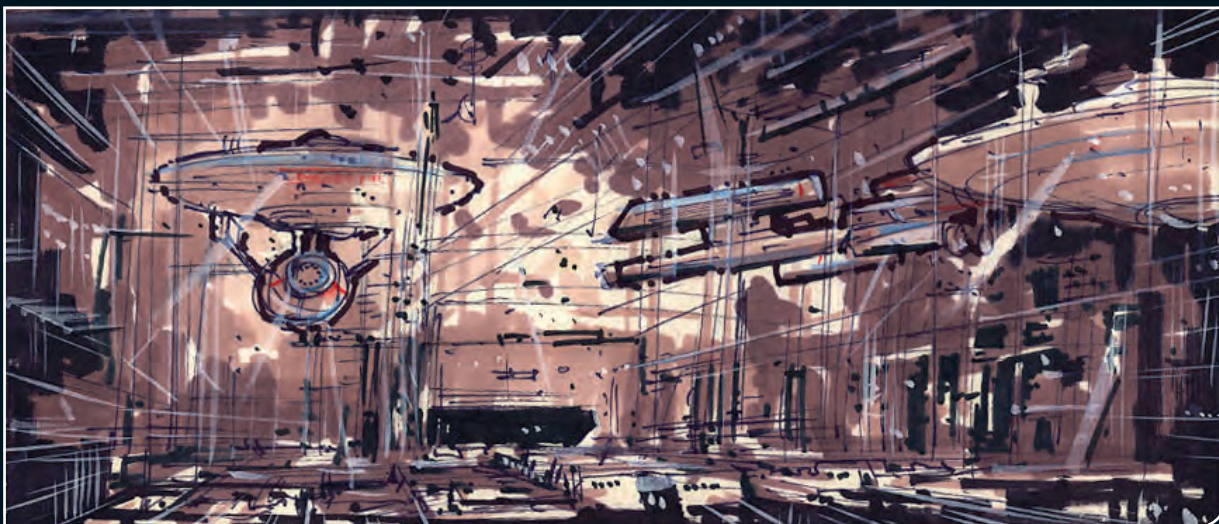
◀ Beams of light define the relationship between the Spacedock interior and the concept *U.S.S. Excelsior* in this design sketch.



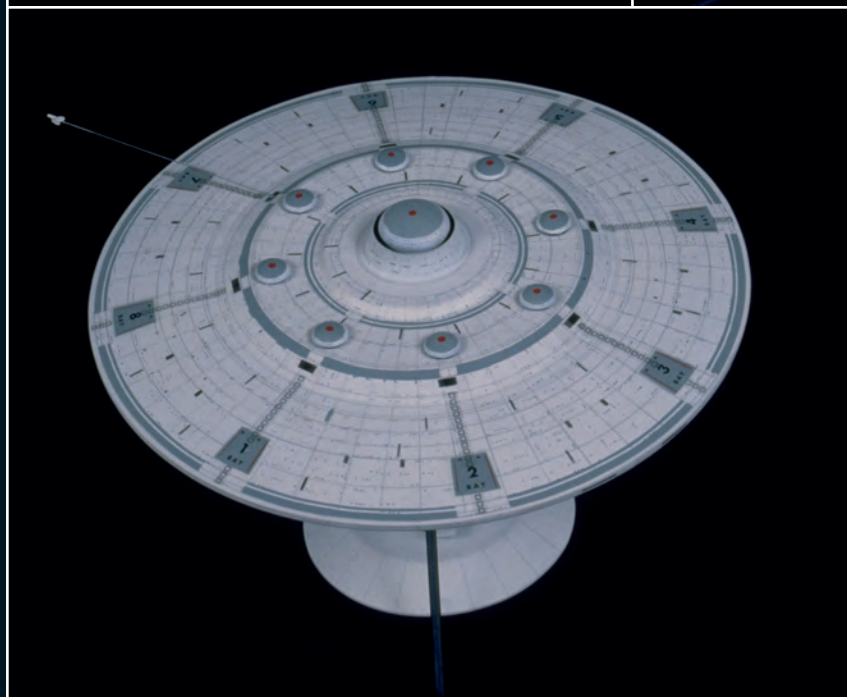
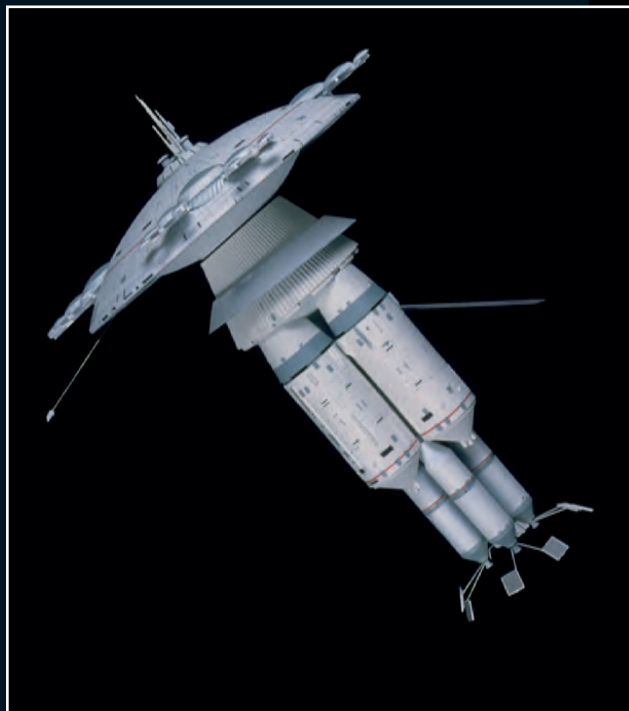
◀ A storyboard image by David Carson plots the course of the *U.S.S. Enterprise* as the doors of Spacedock rotate to meet the ship.



◀ One of Carson's most ambitious ideas for the Spacedock was a light rail system encircling the cavernous interior.



◀ Dozens of slender spotlights serve to anchor docked ships in another of Carson's early sketches.



▲ Two study models of Spacedock built by Bill George (top and above), alongside the approved study model combining favored elements from earlier versions (right).

Once director Leonard Nimoy had approved the final Spacedock study model, Gawley and his team began work on the real thing. Two large-scale filming miniatures were built at ILM's Marin County, California headquarters: a complete exterior model measuring about 6ft tall, and a partial interior measuring about 20ft across.

The exterior model was made from molded clear plastic panels built around a metal frame and filled with a continuous network of neon light tubes. The entire surface was then covered with



thin metal plates that were etched with holes to create thousands of tiny windows, illuminated from behind. Once complete, the model was mounted on pylons against a bluescreen, and cooled with compressed air to prevent the enclosed lights from overheating and melting the exterior.

Filming the model should have been fairly straightforward. The plan was that it would be shot once, fully lit against the bluescreen, and then again, unlit, against a white background to create a matte silhouette. This silhouette would then be



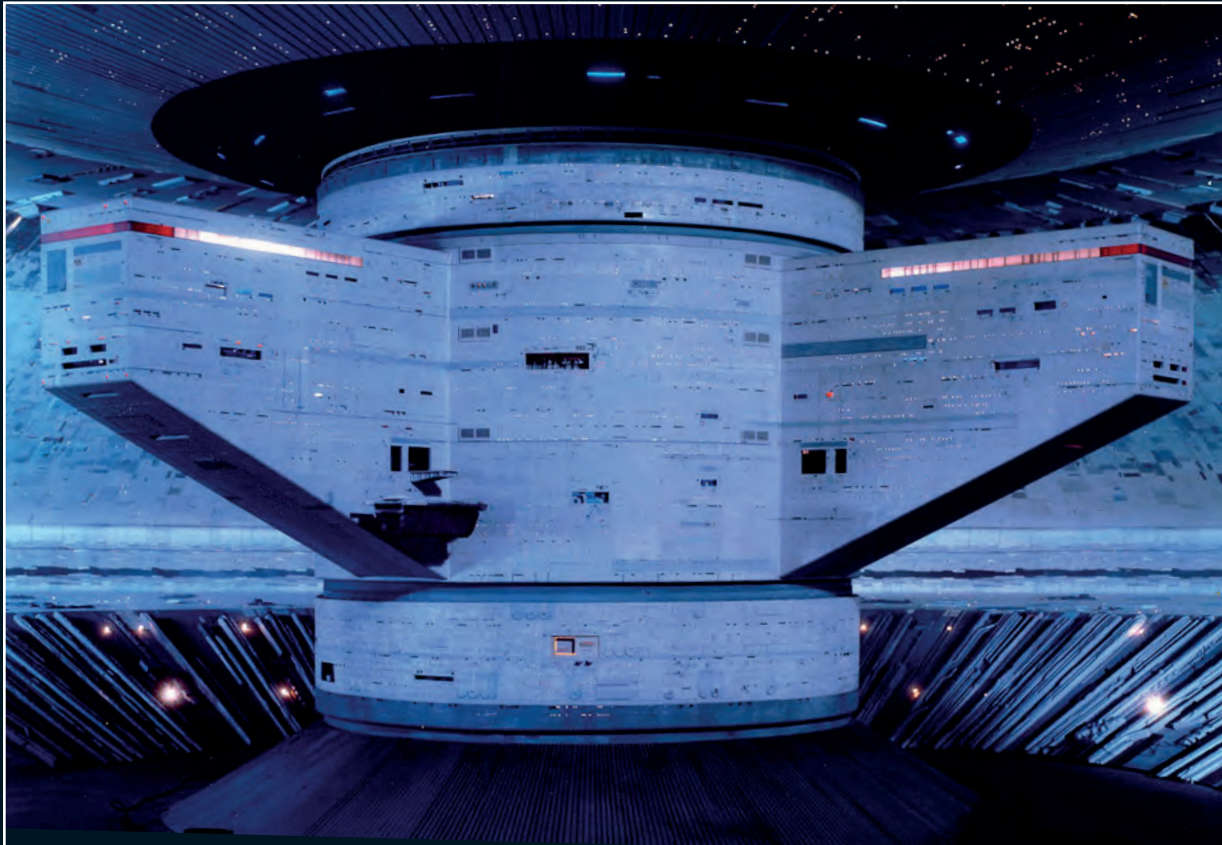
used to blot out part of a matte painting of Earth and space, into which the Spacedock model would be composited using an optical printer.

However, the smooth off-white surface of Spacedock added an extra layer of complexity by proving susceptible to 'blue spill' – an effect whereby a reflective object picks up color from the bluescreen. This can then cause sections of the object to disappear in the compositing process, when all blue is removed from the original shot. To solve this problem, ILM fitted the studio lights with

yellow gels, giving Spacedock a greenish hue that had to be filtered out in the compositing process.

No new miniature ships were built for shooting alongside the Spacedock exterior model, and instead both the existing 8ft *Enterprise* model and the new 10ft *Excelsior* model were shot separately on bluescreen stages and composited in at the appropriate scale. A hemispherical model of Earth was built especially for some shots, however, and was used instead of the matte painting in longer shots where the planet's rotation (or lack of)

▲ ILM technicians work on neon lighting inside the full-size Spacedock exterior model, prior to the addition of etched decorative panels.



◀ The completed interior model, ready to be combined with bluescreen starship and shuttlecraft elements.

would be noticeable. This half globe was painted by matte artist Frank Ordaz and showed continents and oceans on one side, with cloud formations against a black background on the other. Both halves were filmed in motion at slightly different speeds and then combined via double exposure for an authentic-looking atmospheric effect.

INSIDE STORIES

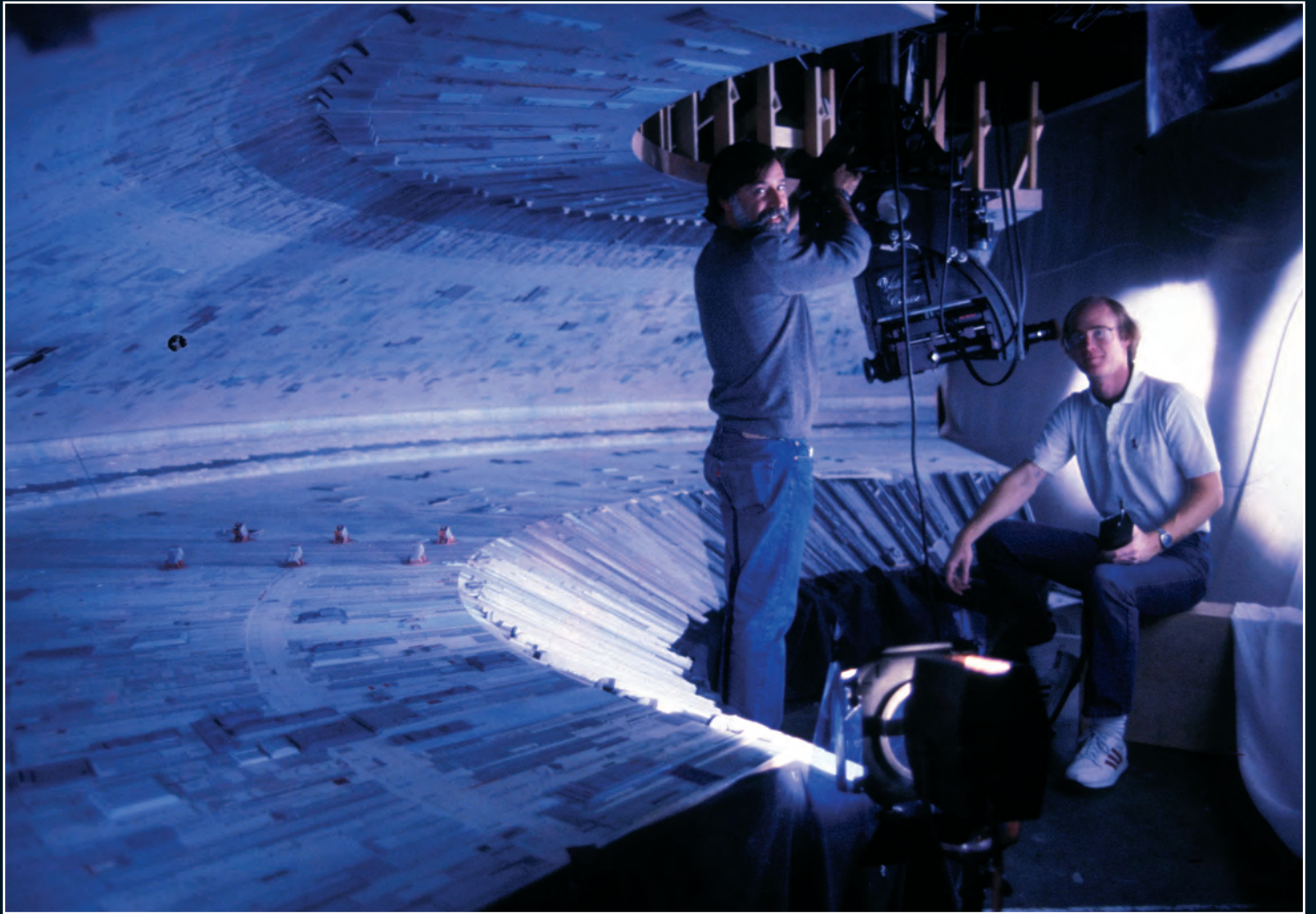
While these ingenious techniques were all in a day's work for ILM, creating and filming the inside of Spacedock posed a much greater set of challenges. The massive interior model was made in two parts: a movable central column with docking spurs and a partial ceiling; and a curving outer wall section with a working door mechanism. The central section was a traditional miniature, built in a similar way to the exterior model, while the sweeping perimeter wall was a huge wooden frame that would have been very expensive and time-consuming to detail fully in three dimensions.

"Those walls did look incredibly detailed," explained Gawley, "but, in fact, they were effectively wallpapered. It would have been a huge project to build in 3D, but Bill George



▲ In a finished shot, footage of the differently scaled miniatures are combined, with lighting effects also composited in to pull the disparate elements together.

came up with this great idea. He said: 'Why don't we just make a drawing of one section, then do a bunch of colored Xeroxes?' So that is what we did." Only ever seen at a distance, these paper duplicates effectively conveyed the sense of a highly detailed interior when pasted onto panels across the model. "When you don't have a lot of money to spend, it forces you to be innovative," said Gawley. "It worked out really well."



On the far side of the outer wall frame were: powerful Fresnel lamps to create the illusion of lit windows through pinholes in the 'wallpaper'; a motion-control motor for the sliding doors; and electric fans to stop the wallpaper from warping under the heat from the lights. When the doors opened, they obscured the light coming through the pinholes on either side, so additional fiber optics were built into this section of the frame.

Most impressively and unusually of all, this entire set-up was designed to be reversible, so that the lamps, motors, and fiber optics could be moved to the 'inside' of the wall, with new decorative panels attached to the 'outside'. This allowed for close-ups looking in through the opening/closing doors from space that could not be achieved with the smaller full exterior model.

Before the ILM team could even think about repurposing the outer wall, however, two whole months of arduous interior model photography awaited them...

▲ ILM cameramen Robert Hill (standing) and Scott Farrar with the outer wall section of the interior model. The missing central column section could be moved in and out of the area where they are working.



▶ The outside of the interior model, dressed so that the only set of motorized doors could also be filmed from the outside, with all hidden workings moved to the inside once the interior shots were completed.

“We spent weeks inside there,” visual effects cameraman Scott Farrar confirmed, “and it was darned hot inside! We decided on a cool look, which meant putting blue gels on the lamps lighting the model. The problem with that is that the light can’t be bright: the more you add, the more it destroys the saturated blue. So the only way to get the background we wanted was to use fewer, dimmer light sources and do longer exposures. That’s partly why it took a long time.”

To create a sense of distance and make the set look less like a model, Farrar and assistant cameraman Robert Hill also shot in a fine haze of smoke, slowly combining multiple camera passes to get a consistent look with this highly unpredictable element.

“The only way to make it look good was with smoke,” said Farrar. “But we also wanted these beautiful beams of light. There was no way to get a really good-looking ray in the smoke, so I shot a pass where we used cutout wedges of white cardboard, with some diffusion on the lens. When we used that very gently as its own pass, it looked like a fantastic beam of light.”

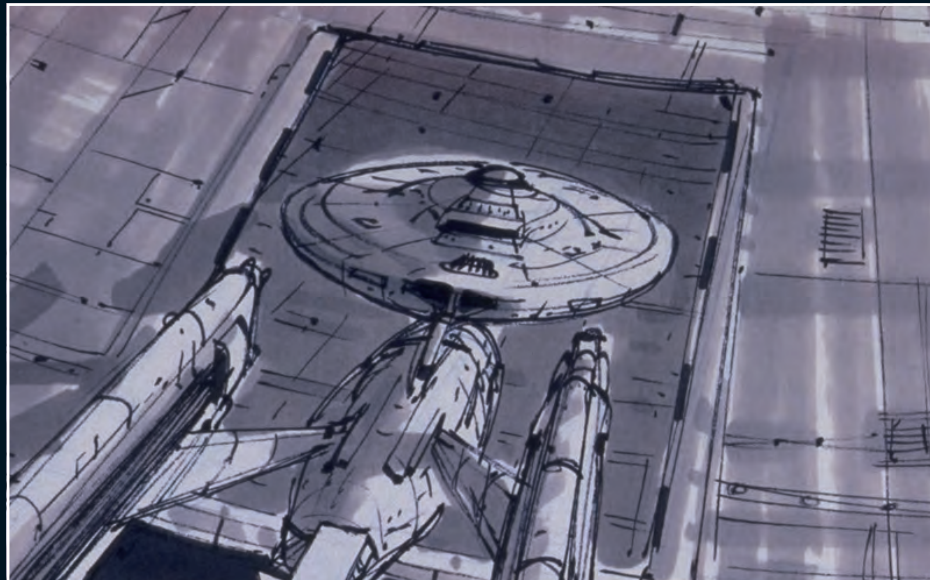
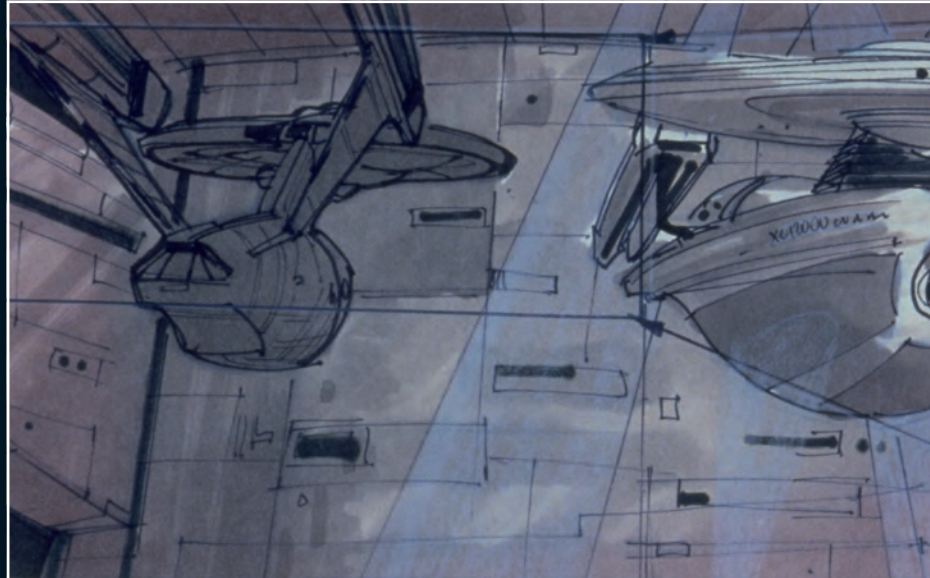
DOCKING MANEUVERS

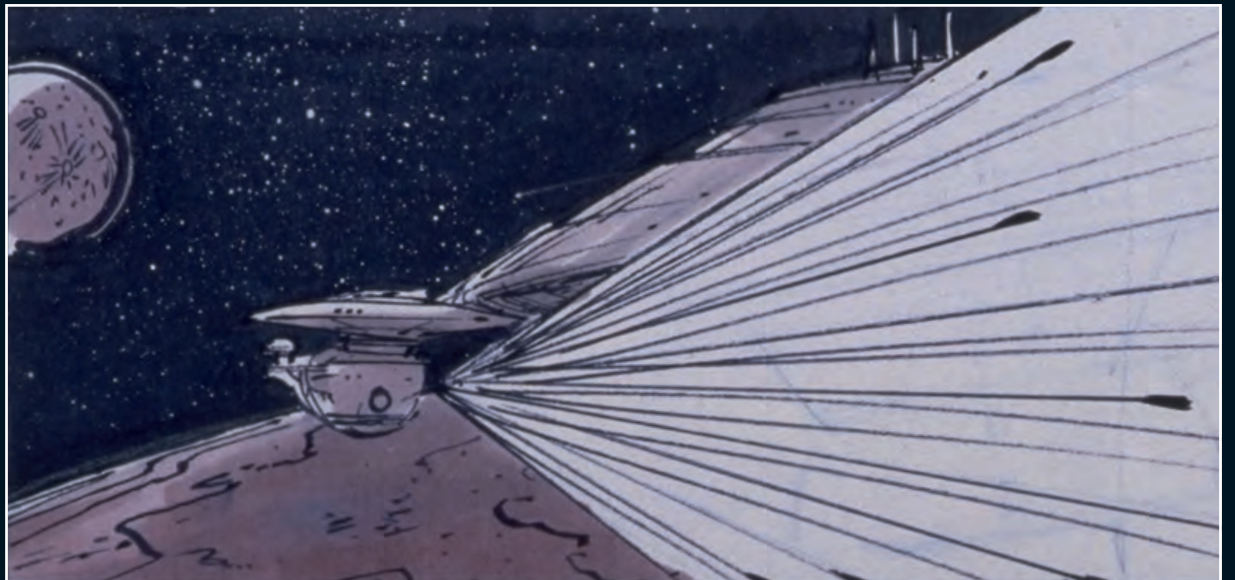
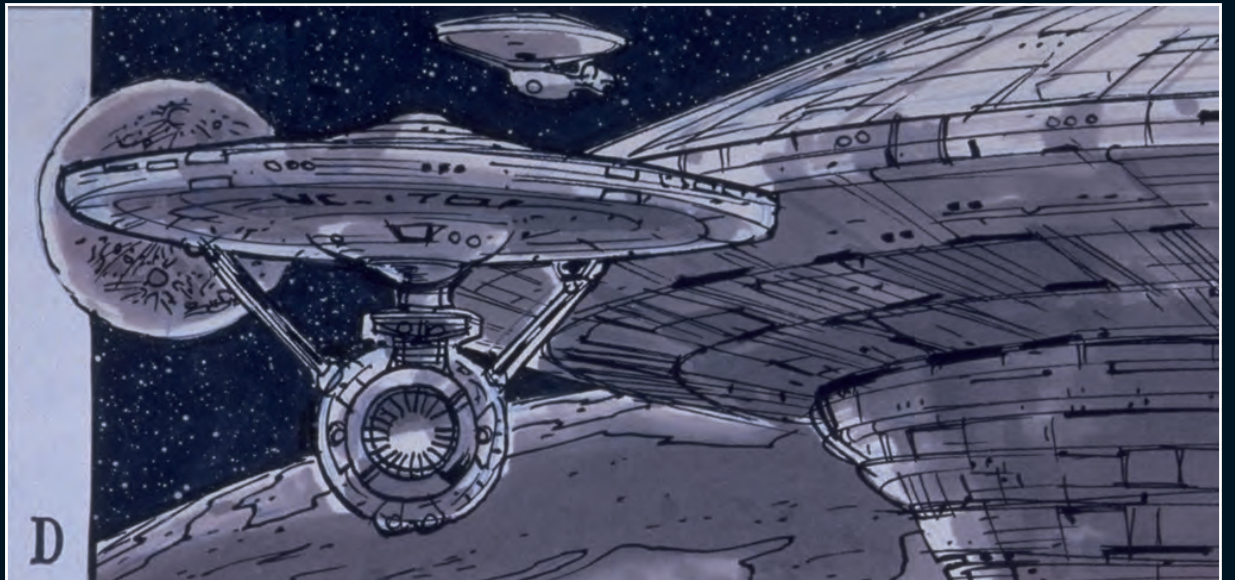
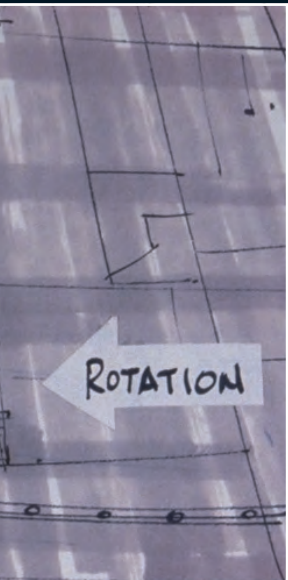
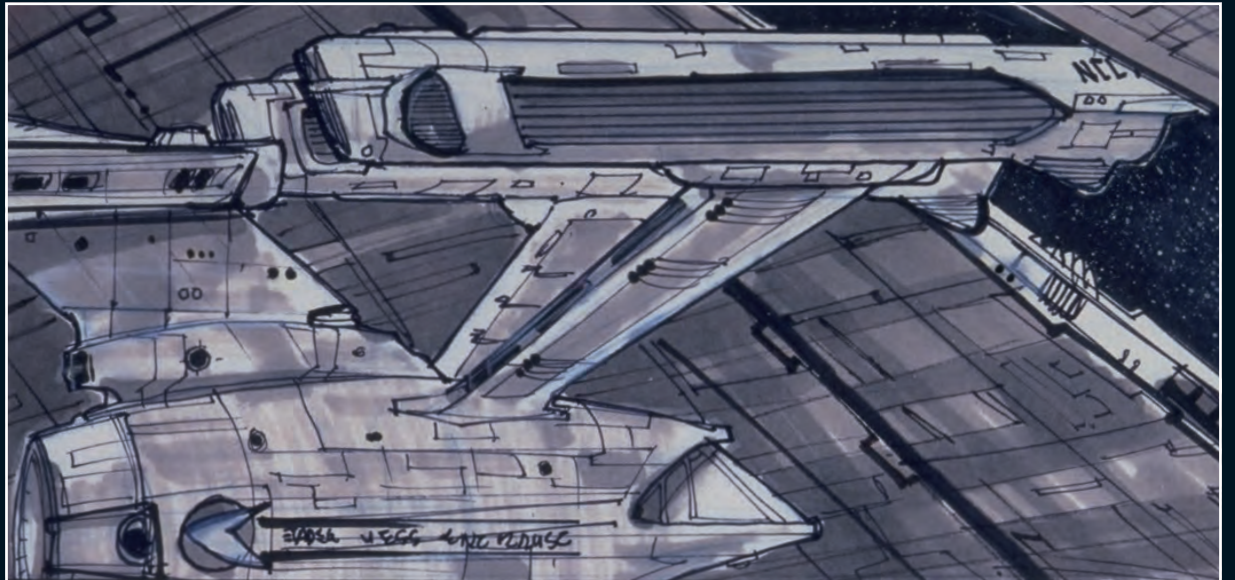
As with the exterior sequences, the *Enterprise* and the *Excelsior* were both filmed separately from the interior and composited into Farrar’s background shots. This approach was inevitable because of the varying scale of the ships, and the absence of smoke in these bluescreen elements helped to foreground the ships in the finished shots. However, it posed one of the greatest challenges of all, owing to the length of the shots and the amount of camera movement involved.

“Everything had to be figured out,” explained Farrar. “We had small versions of the ships for lining up the shots, which we’d move and even photograph to see what angle we should be using later when we did the real ship on the bluescreen. But you couldn’t build a ship that small with enough detail to film it for real.”

What made life even harder for Farrar was that the docked *Excelsior* had to remain

► Storyboards for the “Stealing the *Enterprise*” sequence convey the huge number of angles and complex effects elements needed to do justice to one of *STAR TREK III*’s most memorable scenes.







stationary relative to the interior model – a far more complex bluescreen challenge than compositing a moving starship on to a jet-black outer space background. “That was really tough,” he recalled. “There’s no secret to that. It just boils down to doing it again and again until it looks right.”

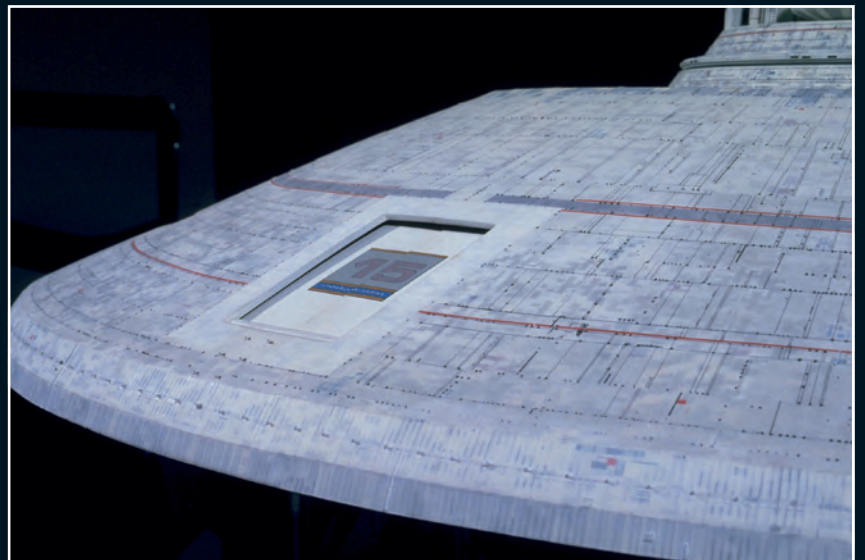
As Farrar worked on the interior, his fellow visual effects cameramen Donald Dow and Selwyn Eddy III were on a nearby stage filming the full-size ship miniatures that would inhabit it. As with Spacedock itself, each ship called for up to eight camera passes, with an initial ‘beauty pass’ augmented by passes at different levels of exposure to capture the models’ various practical lights at the correct color and intensity. The small shuttlecraft that added subtle detail to the Spacedock interior were also bluescreen elements in their own right, meaning that a finished shot of the *Enterprise* and the *Excelsior* in Spacedock together could

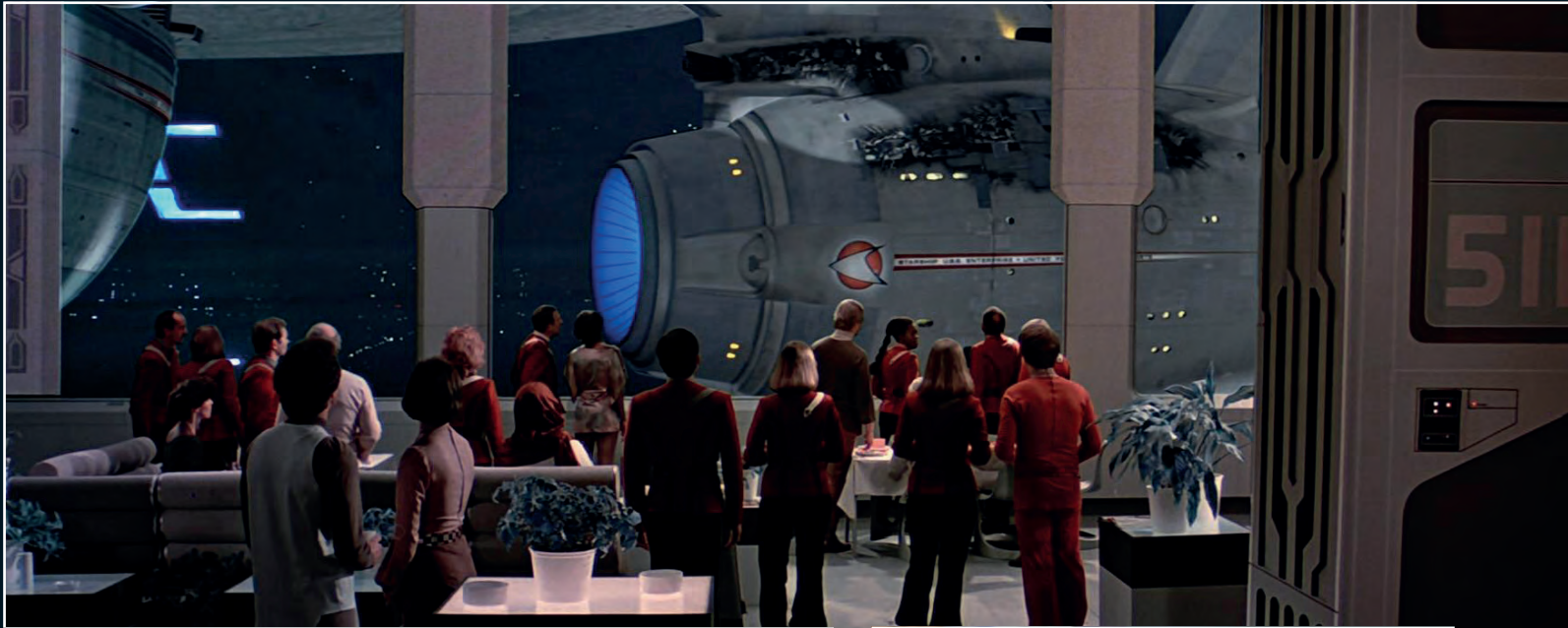
▶ A side view of the dressed outer section of the Spacedock interior model, which dwarfed the full-length exterior model.

comprise up to 30 different elements, all combined on ILM’s ‘work horse’ optical printer.

Yet there was still one further element needed to complete the Spacedock sequences – and an unusual one for ILM. On an additional stage, the

▲ In this shot, the two Spacedock models are combined via skillful compositing – along with numerous other effects elements.





▲ The completed effects shot of the Spacedock cafeteria (top), and director Leonard Nimoy on the bluescreen set at ILM (above). Note that the top of the window frames is a matte painting.

Spacedock viewing window originally proposed by Carson was built as a live-action cafeteria set, looking out on to what was then the biggest bluescreen in the world – only recently mounted for *Star Wars: Episode VI Return of the Jedi*. On to this would be composited the stationary far wall model and the moving *Enterprise* model, giving the impression that the cafeteria was located in Spacedock’s central column.

Both Nimoy and Bennett traveled to ILM to supervise the filming of two short sequences on this set, designed not only to cement the idea of Spacedock as a ‘real’ location with people inside it, but also the huge scale of the *Enterprise* within a potentially diminishing environment. Some 40 extras (and *THE ORIGINAL SERIES* actor

▲ In *THE ORIGINAL SERIES*, Grace Lee Whitney played Yeoman Janice Rand. In *THE SEARCH FOR SPOCK*, she appears inside Spacedock as a Starfleet commander, and is credited only as ‘Woman in Cafeteria’.

Grace Lee Whitney in a cameo role) took part in the first of these scenes, in which Starfleet officers and civilians react to the arrival of the battle-damaged *Enterprise*.

“I remember how difficult that was to pull off,” said Rodis-Jamero, whose role expanded to include consulting on set design as the production went on. “That was the first time we had actually put a window next to the *Enterprise*. Before that, it was just a ship coming in to dock.”

Meanwhile, only the film’s director of photography, Charles Correll, featured in the second scene, uncredited as a cleaner who sees the ship being stolen in the small hours. The final touch to both ambitious composite sequences was a matte painting adding height to the set.

DOWN TO EARTH

As well as designing Earth's Spacedock, the ILM team also turned their attention to the planet's surface in *STAR TREK III*. As realized on screen, the Earth bar visited by Dr. McCoy is a simple redress of the Enterprise sickbay set, with no location given. But ILM concept art shows how it might have looked – complete with an establishing matte shot that would have placed it firmly in a preserved area of San Francisco Bay, just a short distance from Starfleet Headquarters.



TURN, TURN, TURN

Looking back on the making of *THE SEARCH FOR SPOCK*, Farrar identified the key factor that made the effects work so labor-intensive, but also so satisfying to watch.

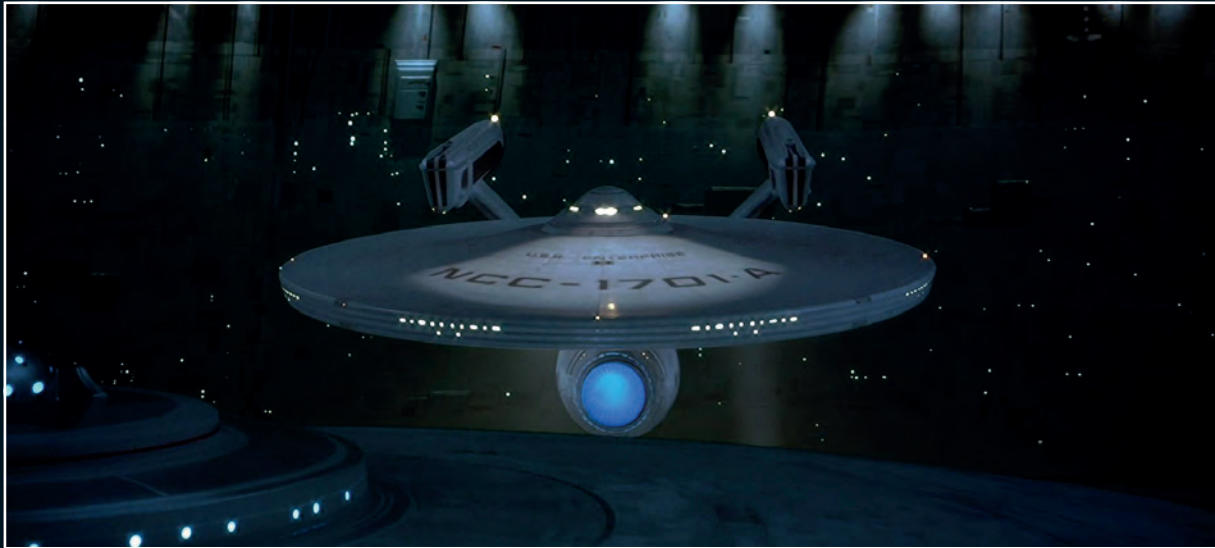
"Every single pass took hours and hours," he said simply. "What was significant about that film was that, prior to that, the cut-length for effects shots was always rather short. For *Star Wars*, George Lucas liked to see how much a person could absorb in 20 or 40 frames. That's part of the look of *Star Wars*, where you have lots of quick cuts with a lot of production value in each one.

"The idea behind the shots in *STAR TREK III* was to have these gloriously beautiful, wonderfully lit ships moving slowly, and therefore we were suddenly doing hundreds of frames per effects shot. Until then, we hadn't ever had shots that long, so it changed the way we did things – and how long it took to do them."

The two Spacedock models had differing fates after *THE SEARCH FOR SPOCK*. The traditional full-length miniature was retained, and pressed into service again in *STAR TREK IV: THE VOYAGE HOME* and *STAR TREK VI: THE UNDISCOVERED COUNTRY*, with stock footage used for *STAR TREK V: THE*

► ILM's Bill George took the opportunity to shoot Spacedock from a new angle in *STAR TREK VI* (right), while footage from *STAR TREK III* was reused to create a new shot of a much larger space station in orbit of Tarsas III for *THE NEXT GENERATION* (far right).





◀ A relatively small section of the interior wall of Spacedock, as seen in *STAR TREK IV*.

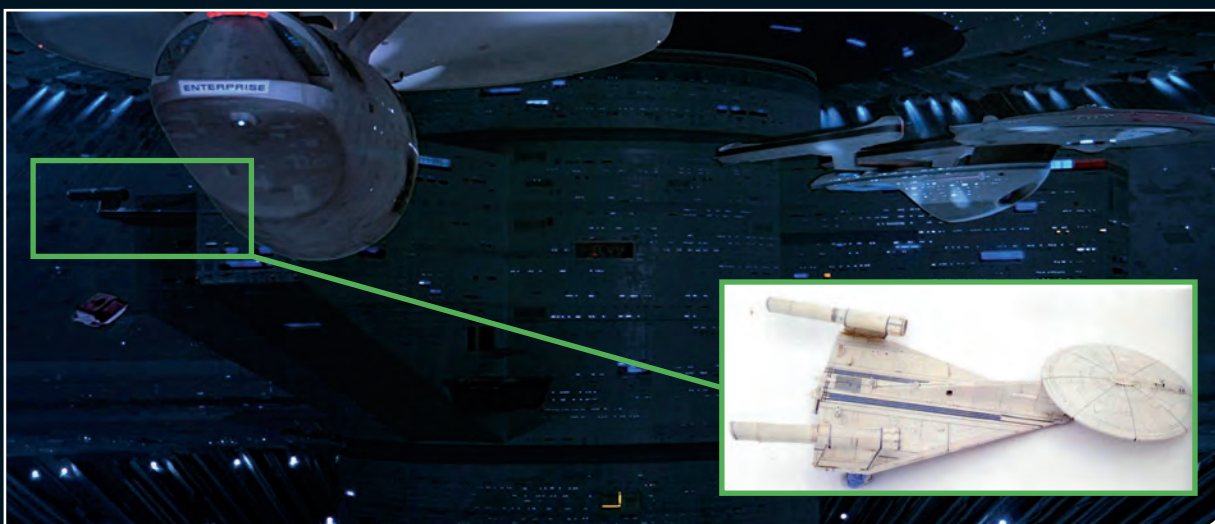
FINAL FRONTIER (and to represent Starbase 74 in the *STAR TREK: THE NEXT GENERATION* episode '11001001'). However, after the large and fragile interior model was adapted for use in the exterior close-up shots, it was unceremoniously dismantled and destroyed. Less ambitious recreations were assembled for both *THE VOYAGE HOME* and *THE UNDISCOVERED COUNTRY*, while *THE FINAL FRONTIER* again relied on stock footage alone.

More recently, a computer-generated model of Spacedock under construction made its first appearance in the first season finalé of *STAR TREK: DISCOVERY*. This has a satisfying circularity about it, because, if you look closely at the Spacedock interior *THE SEARCH FOR SPOCK*, you'll notice that there is, after all, one ship physically present inside the model rather than composited in. It's the small study model of the *U.S.S. Enterprise* built for the unmade 'Planet of Titans' movie



◀ The view from the *Enterprise* as it leaves Spacedock – a newly built model for *STAR TREK VI*.

(the project that eventually became *STAR TREK: THE MOTION PICTURE*), making its only on-screen appearance to date. And while this unassuming model is only present to add a little extra interest to the Spacedock interior model, years later its design would capture the imagination of a new generation of concept artists – raising the possibility that the ship that gave chase to the stolen *U.S.S. Enterprise* could easily have been a near-relative of the *Crossfield-class U.S.S. Discovery*!



◀ A 1970s study model for an unused *Enterprise* design is visible inside the Spacedock interior in *STAR TREK III*.

STAR TREK™

