Excerpt from Joan's Spacecraft Spectacular 2685: Excalibur

F-103 E-X, the lost Excalibur

Section 1 – Introduction

Even before the Nephilim incursion in 2681, Douglas Aerospace understood that the F-103's time as the undisputed king of space superiority fighters was nearing its end. New carriers, especially the Midway and Cerberus classes, were being designed without a through-deck flight deck and given the Excalibur's tall vertical stabilizers, were incompatible with magnetic launch tube system. Additionally, the deployment of the F-108 Panther and F-109 Vampire with new thrust-vectoring technology, further emphasized the lack of modern technology which would, the Douglas board concluded, relegate the Excalibur as a class B space superiority fighter in the new classification system. This belief was crystalized in the minds of the Douglas board, albeit wrongly, by the loss of the *TCS Mount Saint Helens* as well as the public view that D-model Excaliburs played second fiddle in the defense of Ella star base, to the *TCS Cerberus'* Panther squadron in order to repel the Nephilim attack later that same year. Even though contemporary records and post-action reports indicated the "outdated" F-103D still maintained an average K-D ratio of 8 to 1 over the course of the Nephilim war, pride would drive Douglas to begin work on a new Class A fighter based off the F-103 spaceframe, completely unasked for by the Confed Navy Procurement Bureau.

Encrypt +++5.13 D – 0123348I-AG +++

The original engineering team which created the F-103 A was pulled together for the project, many of whom had gone on to other firms or had retired were rehired by Douglas at considerable expense, was given the task of designing the next generation Excalibur in less than two years. Dr. Gerhard Singh who designed the Panther's thrust vectoring actuators and the underlying software was chosen as the design lead. The requirements were fairly straightforward: the new design had to have thrust vectoring technology to match or exceed the maneuverability of the F-109, work with all launch and recovery systems currently in use, match or exceed the current generation F-103's firepower, keep costs down by reusing as much of the existing F-103 technology as possible. Thus in November 2681, the F-103 E-X project was born.

Section 2 – Aerospace Design

The first hurdle was maneuverability, At 32 meters nose to tail and 18 tons clean, the Excalibur is simply a larger and heavier spacecraft than the F-109. The engine nacelles were heavily modified to accept two Dynatec Hyperion VII Ion drives, which could propel the new fighter at 600 kps matching the top speed of the Vampire. The housings also contained Dr. Singh's latest actuator design and the thrust vectoring nozzles. Early simulations showed that even with a faster response and shorter travel time than the F-109, the pitch and roll still lagged significantly behind their chief rival. To counter this, the RCS system was completely reengineered, using more powerful

RCS thrusters. These were slaved to Dr. Singh's thrust vectoring flight control software which would augment the pitch and roll rates, allowing the new F-103 to exceed the Vampire's pitch rate by 10 degrees per second, but even with the improved RCS system, the placement of the engines so close to the centerline caused the F-103's roll rate to lag behind the F-109's at only 170 DPS.

Early concepts removed the vertical stabilizers altogether, however the board overruled the design team, arguing that the Excalibur's atmospheric combat abilities added tactical flexibility that the F-109 didn't have, and that the stabilizers were iconic and must remain. So, the stabilizers were redesigned with a 45-degree cantilever inboard from the wing root in order to fit in the hexagonal tube assembly. The wing gun pods were strengthened, and an internal collar was added behind the cockpit to act as attachment points for the launch rail crane system on the Midway class carriers. Wind tunnel tests showed that the new wings were less stable than the straight configuration, but it could be compensated for by the Merlin 2 AI overseeing the flight control system. However, the ability for the pilot to override the FCS in atmosphere was removed to prevent the pilot from overstressing the spaceframe and disintegrating the fighter during combat maneuvers. Retractable cowls were added to the guns, to protect them during re-entry.

Section 3 – Weapons and Combat Capabilities

The weapons and fire control systems were similarly redesigned based on the initial intelligence from the Nephilim incursions. Analysis indicated that the invaders embraced the belief that quantity is a quality of its own; coupled with the tactic of using interceptors to swarm and overwhelm defending fighters allowing strike craft to attack high value targets with near impunity. In this new environment older fighters like the Thunderbolt VII, had difficulty tracking massed Nephilim fighter formations and often lost returns during a dogfight putting the pilot at a significant disadvantage. Newer fire control systems in the century series of fighters, designed before contact with the Nephilim, could track up to 40 targets but were limited on being able to accurately prioritize targets for the pilots. So the EX design team attempted to seize the moment and opted to use a modified Fairbanks-Chisholm Farsight Centurion sensor suite, an unused system initially designed as a shuttle-to-SWACS conversion kit. This system, when mated to the Merlin 2 AI, could independently track up to 60 individual targets, profile their emissions, and compare it against the internal warbook, allowing the system to identify and prioritize targets for the pilot. If a target wasn't in the warbook, the system could profile the target's emissions against known threats in the warbook in real time and assign a probable threat rating for the pilot.

Dr. Rogilio Attamasus, head of the EX weapon's program was a firm believer in "missiles first, guns last" as a design philosophy. Believing that the EX could use its superior speed and maneuverability to avoid the interceptor shield and engage priority targets with missiles from range, Dr. Attamasus left the direct-fire weaponry unchanged from the F-103 D. Instead, the design team instead took advantage of the latest advances in missile micronization technology, redesigning the internal missile bay to accept a modular missile pod or "clip" which held up to 25 missiles including modern varieties such as the Tracker MIRV, Swarmer AB, Artemis ER-LRIR, and Javelin III ER-HS+ series of missiles. For strike missions, the F-103 EX could also carry up to 4 Lancer torpedoes, as well as Anti-radiation munitions and Mosquito homing rockets. Extra MMP's could be loaded and stored on the carrier and could be changed out within 10 - 15 minutes. meaning that a properly trained deck crew could complete re-amrming more quickly in most cases than refueling the fighter. Unlike contemporary systems Panther or Vampire systems, which required that certain missile types be loaded into specialized bays, The software powering the modular missile pod could identify the missile types loaded once the pod was installed in the bay and within 2 minutes it would reconfigure the entire fire control system for the new loadout.

Section 4 – Evaluation & Performance

Using their contacts within the Confed general assembly, the Douglas team presented the F-103 EX to the Navy procurement office in early 2682. The EX was initially met with skepticism, on paper it wasn't enough of an improvement over the F-109 to warrant serious consideration, however there was enough interest among the old guard, many of whom had flown the F-103 B and D models, to get an order for 3 initial prototypes. Douglas, who was betting on the nostalgia factor, had already retooled their Avalon facility to build the new Excalibur. The initial 3 prototypes were delivered by year's end for evaluation. Pilot reaction to the new Excalibur was initially favorable, however they felt that the guns, specifically the Ion cannons, which were the same as the D model, lacked the range of the particle guns on the F-109. More disastrous however, was that the new sensor system overwhelmed the pilot's workload, with Merlin constantly calling out targets to the pilot and deriding them when they ignored him - was at best annoying, and at worst a deadly distraction in combat. Rather than give up on their crown jewel, the F-103 team took the unusual step of modifying the design to use a tandem cockpit. The redesign would resurrect the concept of the radar intercept officer, or RIO; a pilot who would partner with Merlin to identify and prioritize high-threat targets, especially in a cluttered engagement zone, and mark them for the pilot to prosecute, allowing medium and Class B space superiority fighters to engage the enemy's fighter screen.

Section 4 – Evaluation & Performance

The redesign cost the team 6 months while the assembly line accepted the new design, and Douglas spent additional time and money ensuring that interest remained high, however in February 2863 prototype 4 rolled off the line. Ultimately, 7 evaluators were built and a recon variant had been proposed that would again make use of the MMP's flexibility to add a modular cloaking device, additional fuel tank, and additional data storage which could store navigational data for up to 3 nearby star systems, allowing the RIO to plot jumps to nearby systems without the need telemetry from a carrier. Fighters 5-7 replaced the ion cannon with the chain-ion to improve the F-103 E-X's rate of fire and range. Final evaluations were overall favorable, The F-103EX met or exceeded all of the design goals laid out by Douglas. Unfortunately they weren't significantly impressive to warrant the procurement office to authorize purchasing a competitor for the already in-service F-109. Douglas didn't feel that cannibalizing their profits on the F-108 program would be worth marketing the EX as an "improved" class-B space superiority fighter (SS B+), and so in late 2683 the EX program was shuttered.

Section 5 – Summary

Douglas was always playing a long hand with the EX program, banking on contacts and nostalgia to carry the day. This is not to say that the EX was a bad fighter, quite the contrary, had it been delivered in 2680 – 81 there is a good chance it would have beaten out the Vampire as the standard Class A space superiority fighter.
The F103 E-X was the right fighter, at the wrong time.

Surviving examples of the F-103 E-X are #7, which is currently on display at the TCS Victory museum in the Sol system, and #1 –the only surviving example of the single-seat version, which is currently housed at the Douglas headquarters in Austin, Texas; of those only #7 is still flightworthy. The remaining EX fighters were disassembled for educational purposes. Though a costly boondoggle for the Douglas board in many ways, many of the advancements pioneered in the EX program, such as the MMP and a scaled down version of the Farsight Centurion system would see new life in the more brutalist F-103 G-WVN Excalibur “Wyvern” program. Which would see heavy action serving off Battlecruisers in the latter half of the Nephilim war and remain in service today.