Model 8 F-106
Delta Dart

Officially designated F-102B (Model 8-21) until 17 June, 1956, the F-106A was the original concept for the '1954 Interceptor' programme (WS 201B) that slipped with the F-102A development problems. With Cold War tensions increasing, emphasis was placed on achieving operational status with the F-102A rather than treating it as an interim design. Thus, only seventeen F-102Bs (56-451/467) were ordered on 28 April, 1955, with Pratt & Whitney J75-P-9s instead of the intended and aging Wright J67 (licence-built Bristol Olympus), now a year behind schedule. The following September, the USAF specified that the new aircraft would become available in August 1958 and that the F-106A was expected to be able to intercept targets under the control of Semi-Automatic Ground Environment (SAGE) centres up to a radius of 430 miles and 70,000ft altitude and launch nuclear missiles and rockets with the Hughes MA-1 fire control system. Later this requirement was reduced to 50,000ft.

The wing of the F-106A was similar to that of the F-102A, but the fuselage was extensively modified with a more streamlined shape with the variable ramp air intakes moved well aft of the nose, closer to the engine. The fin and rudder shape was also changed and a new undercarriage installed with steerable twin-nose-wheels. As on the F-102, the armament was housed internally but upgraded to two Douglas MB-1 (AIR-2A or 2B) Genie unguided nuclear missiles and four Hughes GAR-3 or -4 (AIM-4E or G) Falcon radar or infrared homing missiles.

F-106B-1-CO (Model 8-27)
59-0162 of the 84th FIS at Hamilton AFB, California, in July 1969. (John P Stewart)

F-106A-90-CO (Model 8-24)
57-2504 posed aga inst the backdrop of the southern Sierra Nevada range during a pre-delivery test flight. (Convair)
The first flight was made by Richard L Johnson at Edwards AFB on 26 December, 1956, and the second aircraft (56-452) flew exactly two months later. Early testing took the F-106A to Mach 1.9 and 57,000 feet but that was still short of expectations because of airframe design problems and the poor reliability of the J75-P-9 engine. Eventually this prompted the use of the more powerful 17,200 lb st-17. Early in 1957, the whole programme was in jeopardy because of budget cuts and further problems, including those with the MA-1 and the cockpit layout. Originally, the control column occupied the tradition centre location but was moved to the side at USAF insistence to allow an unrestricted view by the pilot of the Horizontal Situation Indicator (HSI). However, the USAF changed its mind again and the column, with a unique two-handed grip for both aircraft and radar control, was returned to the centre for production aircraft. Convair also proposed an ejection system in which the seat rotated and pilot emerged feet first and on his back. A more conventional method was adopted, although this was not upgraded to supersonic capability until 1960. Initial aircraft had boundary layer fences as on the F-102, but production aircraft had wing leading-edge slots instead.

In mid-1957, when the type was named Delta Dart, it was planned to acquire one thousand aircraft for forty Air Defense Command (ADC) squadrons but by September 1958 the total had been reduced to a third, enabling just fourteen squadrons and a training unit to be equipped. Thus, only a further 260 F-106As were ordered (57-229/246, 57-2453/2506, 58-759/798, 59-1/148) and modifications brought the earlier aircraft up to this Model 24 standard. The first twelve aircraft were temporarily designated JF-106B for flight tests but a total of thirty-seven (including the two initial aircraft) were used to speed development tests.

Additionally, sixty-three tandem two-seat Model 8-27 (57-2507/2547, 58-900/904, 59-149/165) were ordered on 3 August, 1956, and the first flight was made on 9 April, 1958. The layout was chosen to avoid the problems experienced with the side-by-side trainer version of the F-102 and the aft cockpit reduced fuel capacity and displaced the avionics to the weapons bay. Originally intended as a pure trainer designated TF-102B then TF-106A, F-106B was eventually used when full combat capability was specified by the USAF. The first eight aircraft were temporarily designated JF-106B for flight tests and the first delivery made in February 1959. However, the F-106B suffered from the same development problems as the single-seater and was not declared operational until July 1960.

Production continued until December 1960, the last aircraft being Model 8-31s and 8-32s (F-106Bs) with improved MA-1, supersonic ejector seat, vertical display instrument panels, Case 29 wings with revised camber (first flown on 57-246), and with provision for 230US gal external fuel tanks.
Under the project name *Wild Goose*, most of the earlier F-106As were rebuilt by Convair to this standard from September 1960. Throughout its long service life, the F-106 was constantly upgraded. In late 1960, *Broad Jump* covered general improvements, the *Dart Board* (August 1961-April 1962) provided a thermal flash hood, Convair ejector seat, plus addressed a flame-out problem, and in 1963, aircraft were fitted with a Sheaffer Spring Hook arrestor system, the first USAF combat aircraft so-equipped, following tests with the prototype four years earlier. TACAN (Tactical Navigation) and zero-zero ejector seats were installed in 1965, inflight refuelling capability two years later, plus supersonic 360US gal external tanks, and in 1972, a clear canopy for improved vision. After the F-106 exhibited a remarkable dog fighting ability, a 20mm Vulcan cannon was fitted internally to some aircraft although this modification (project *Six Shooter*), along with the new canopy, was not adopted for the F-106B. At the same time, ECM and early-warning avionics were installed.

A number of other Delta Dart models were proposed but remained un-built. Originally known as the F-106X, the F-106C/D (Model 8-28/8-29) was a 1956 study for a Mach 5 canard layout interceptor with a Pratt & Whitney J75, rectangular intakes and a 40in radar dish. On 23 September, 1958, a proposed 350 aircraft were cancelled but two F-106As (57-239/240 msn 8-24-8/9) were designated YF-106Cs and made ten flights to test the new radar housing with a 5ft nose extension from spring 1959. The F-106E/F was proposed with a look-down radar in a 21in extended nose. In 1967, the second use of the F-106X designation covered the plan to modify over two hundred F-106s structurally and with improved avionics at $5 million each to undertake the Improved Manned Interceptor role. The modified Dart would have had a range of 1,500 miles plus Mach 2 capability and operate in conjunction with AWACS.

First deliveries of the F-106A were made to the 498th FIS, Geiger AFB, Washington, in May 1959, and the Dart was operational by 31 October that year. The remaining 13 squadrons were re-equipped by the end of the following year and the last Dart was delivered on 20 July, 1961. On 15 December, 1959, a Dart flown by Maj Joseph W Rogers at Edwards regained the absolute speed record for the USA with a speed of 1,525.6mph at 40,550ft and although this was lost two years later, the single-engined aircraft speed record was held far longer. Another F-106, flown by Maj Frank Forsyth, achieved a nonstop Edwards–Tyndall AFB, Florida, flight on 23 March, 1960, completely under automatic ground control. Although it was briefly deployed to Osan AB, Korea, in March 1968 to provide air defence during the *Pueblo* incident, the Dart never saw combat.

During the early 1970s, as no replacement aircraft were in sight, surviving F-106s with eleven ADC squadrons had their service life increased from 4,000 to 8,000 hours. From 1972, the McDonnell Douglas F-15 started to replace the Dart and aircraft were passed to six ANG squadrons in California, Florida, Massachusetts, Michigan, Montana, and New Jersey. The last of these squadrons eventually re-equipped with the F-16A and the last Dart unit, the 119 FIS at Atlantic City, New Jersey, flew its final alert duty with the F-106 on 7 July, 1988, and by 20 August, all its aircraft had been ferried to Davis-Monthan AFB, Arizona. Despite having the heaviest pilot workload of any USAF fighter, the F-106 recorded the lowest single-engined aircraft accident record in USAF history.

A *Pacer Six* programme for the conversion of 192 Darts stored at Davis-Monthan AFB, Arizona, to QF-106As started early in 1986 and a contract was awarded to Flight Systems Inc at Mojave, California. First flown in July 1987, the target drones will be F-106A-1-CO 56-460 of the 5th FIS, Hamilton AFB, California, in July 1969.

expended at Tyndall and Holloman from 1989.

Two NF-106Bs (N607NA ex-57-2507, N616NA ex-57-2516) were used by NASA as systems development aircraft. The second of these (re-registered N816NA) was modified by the Langley Research Center in 1979 to evaluate the effect of lightning strikes on aircraft. In 1987, it was fitted with Langley-designed and manufactured wing leading-edge vortex flaps in connection with the Advanced Technology Fighter programme and made the first of thirty planned flights on 2 August, 1988, with Philip W Brown.

Two other manned Darts were still in use in early 1990, an F-106A (59-0061) and an F-106B (57-2513), both used as Rockwell B-1 chase aircraft by the San Antonio Air Logistics Center at Kelly AFB, Texas.

**F-106A**

One 16,100lb st Pratt & Whitney J75-P-17 turbojet (24,500lb st with afterburner).

Armament: One AIM-4F/G Falcon internally; the Genie was later replaced in some aircraft by a General Electric M61A1 20mm Vulcan cannon.

Span 38ft 3 1/2 in; length 70ft 8 1/2 in; height 20ft 3in; wing area 697sq ft.

Weight empty 24,861lb (F-106B 25,696lb); gross weight 41,831lb (F-106B 42,720lb).

Maximum speed 1,328mph at 35,000ft; cruising speed 594mph; climb 51,800ft/6.9min; service ceiling 52,700ft; combat radius 725 miles (with external tanks); ferry range 1,809 miles.
General Dynamics Aircraft
and their Predecessors

John Wegg