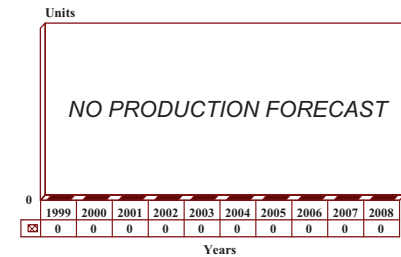


QF-106 Delta Dart - Archived 4/2000

Outlook

- Conversions completed. Final deliveries were made in the fourth quarter of 1994
- The QF-106 has been superseded in US Navy service by the interim QF-4S, which will itself eventually be replaced by the next-generation QF-4E FSAT
- The QF-106 will remain in service until the inventory is exhausted by the US military

10 Year Unit Production Forecast
1999-2008



Orientation

Description. Conversion of F-106 Delta Dart fighter aircraft to a target drone.

Sponsor. US Air Force Development Test Center, Eglin Air Force Base, FL.

Contractors. Honeywell Inc, Defense Systems Division, Albuquerque, NM. This company was formerly owned by Sperry Corporation Aerospace and Marine Group. Tracor Flight Systems Inc, Newport Beach, CA, was involved in the development of the QF-106, but is no longer.

Major Subcontractor. AEL Industries and Vega.

Status. Conversions completed. Final deliveries were made in the fourth quarter of 1994. The US Air Force had 185 F-106 fighters in storage for use in this program. The US Air Force had planned to convert 194 Delta Darts (188 plus an initial six bought in 1986),

including the additional aircraft possibly from overseas sources.

Total Produced. Approximately 181 QF-106 drones (including six prototypes) were converted by the end of 1994. A total of four aircraft were accepted by the US Air Force by April 1991. An additional seven to eight were accepted before the end of 1991, while another seven to eight were nearing acceptance. Procurement was completed in Fiscal 1993, with the final deliveries in the fourth quarter of 1994.

Application. Provide the US Air Force with realistic target simulation during missile firing tests, and weapons systems development/evaluation. The QF-106 will replace the QF-100 Super Sabre drone.

Price Range. The estimated per-unit cost for a QF-106 conversion is approximately \$250,000. This price does not include the airframe.

Technical Data

	<u>Metric</u>	<u>US</u>
Dimensions		
Length	11.67 m	70.8 ft
Height	3.35 m	20.3 ft
Wingspan	21.56 m	38.3 ft
Weight	15,875+ kg	35,000 lb
Performance		
Speed	2,455 km/h	1,525 mph
Operational Ceiling	17,375 m	57,000 ft
Range	1,850 km	1,150 mi

Propulsion. The QF-106A is outfitted with a single 109 kN (24,500 lbst) Pratt & Whitney J75-P-17 afterburning turbojet.

Control & Guidance. The command/telemetry system is a Vega digital tracking and control system. The conversion to remote control operation includes installation of a primary and backup Automatic Flight Control System (AFCS) that controls the drone flight; a missile scoring system that scores missile miss distance; a destruct system that can terminate the drone during

flight; a datalink that supports the radio frequency interface between the drone control system and AFCS; and drone augmentation devices, such as chaff/flare dispensers, electronic countermeasure systems, smoke systems, and continuous infrared pods.

Launcher Mode. Normal runway take-offs for any jet fighter-capable airstrip.

Recovery. The QF-106 is expected to be capable of conventional landings on jet-capable airstrips.

Variants/Upgrades

There is only one known version of the QF-106 Delta Dart target drone, although certain modifications and upgrades may be introduced and installed on these drones.

Program Review

Background. The use of manned aircraft converted into drones for weapon system evaluation/development and various training missions dates back to the Sperry Corporation's Flight Systems Division in the late 1940s for the US Air Force. The US Air Force contracted the company to convert the first three F-80 jet fighters to permit onboard (manned) evaluation of a completely automatic four-axis flight control system with full airspeed control and UHF (non-operational) guidance. Methods of controlling a relatively high-performance aircraft during take-off and landing via a mobile remote control station near the runway were formulated at about that time.

Sperry subsequently fitted QT-33s with flight control and guidance equipment, plus instruments to measure structural blast and gust information resulting from an atomic bomb explosion. Five DT-33s were also converted for air-to-air guidance and control of the QT-33s. At the same time, Sperry built and supplied flight control systems for the QB-17s which gathered samples of the atomic cloud at altitudes from 11,000 feet to 35,000 feet in the same exercise. Some 107 QB-17s were eventually modified and flew more than 1,000 flights as targets until 1959. Approximately 105 QF-80s were later converted to take a complete stabilization and control system based on a Sperry prototype design. These aircraft subsequently flew approximately 900 target missions until 1965.

From 1957-60, the company designed the stabilization and control equipment from the QB-47 and the QF-104; 14 QB-47 and 22 QF-104s were used as targets for Bomarc and other missiles. The QB-47s were operational until about 1965, and the QF-104s until July 1972, flying approximately 190 missions. The QF-104 was the first converted supersonic target which could be

controlled in high-g maneuvers. Also, the company supplied safety electronics for the Naval Weapons Center's QF-86 drone conversion project. This aircraft is controlled directly through the surface actuators from a remote cockpit control station. The safety electronics provide a stabilization backup should the primary command control link fail.

QF-106 Delta Dart. The QF-106 is a US Air Force program to convert General Dynamics/Convair F-106A/B Delta Dart air interceptor aircraft into a drone. These drones would be used as part of weapons system testing and development effort, as well as surface-to-air gunnery/missile crew and air-to-air combat pilot training. The North American Air Defense (NORAD) Command began phasing out the F-106s in 1984, removing them from Tactical Air Command (TAC), Air Defense Command and reserve units. The US Air Force Air Logistics Command will provide support for the drones under the program.

The Honeywell Inc (formerly part of Sperry Corporation) Defense Systems Division, Albuquerque,

New Mexico, was appointed prime contractor on the QF-106 full-scale aerial targets program by the US Air Force in July 1986. Honeywell was the prime contractor, with Tracor Flight Systems Inc its major subcontractor for the full-scale development effort. By August 1986, Tracor Flight Systems had been awarded a \$7.25 million contract for the conversion of six

F-106As to prototype configurations. The contract contains options to convert 192 F-106 fighters to the QF-106 configuration (this number was later reduced to 188 and possibly further to 175). Schedules called for the delivery of four aircraft per month, or roughly 48 per year. Delivery of the first batch began in October 1990 and continued through 1994.

Funding

Funding for this program appears as part of the Target Systems Development program element line. However, this line includes two programs: the Target Payload Systems (Project Number 2459) and Full-Scale Aerial Target Systems (Project Number 3165). Procurement funding for the QF-106 by the US Air Force is included in the service's Target Drones line. This procurement line includes funds for the purchase of other drone systems, such as the BQM-34A. The US Air Force has procured the QF-106 in the following years and quantities: FY89, 48; FY90, 48; FY91, 48. No QF-106s were ordered in FY92, and 40 Delta Dart drones are believed to have been requested by the service in FY93 (this number may have been reduced to 31). No additional QF-106s procurement requests were made in FY94 or beyond.

US FUNDING

	FY90		FY91		FY92		FY93	
	QTY	AMT	QTY	AMT	QTY	AMT	QTY	AMT
USAF								
<u>Proc.</u>								
Targets	49	17.6	103	46.4	42	24.7	124	65.8
QF-106	48	17.1	48	23.5	0	0	40	36.4
<u>RDT&E</u>								
Proj - 1	-	3.2	-	11.0	-	19.4	-	20.6

All \$ are in millions.

Proj - 1 PE#0604258F Target Systems Development Project 3165 Full-Scale Aerial Target Systems. Formerly known as PE#0604211F Advanced Aerial Targets Development.

Recent Contracts

In October 1992, Honeywell Inc, Defense Avionics Systems Division, Albuquerque, New Mexico, was awarded \$11 million for 36 QF-106 FSATs. Contract work was completed in July 1994. Contract Number F08635-86-C-0180 P00046. In January 1992, General Electric Company, Cherry Hill, New Jersey, received an operational and maintenance contract award worth \$5.4 million. The contract includes work on the QF-106, as well as the QF-100, MQM-107 and BQM-34A. Contract Number F08637-92-C-0025. Honeywell received a \$35.9 million contract for the conversion of an additional 48 F-106s in July 1989. The contract was completed by September 1991. In November 1990, Honeywell Inc, Defense Avionics Systems Division, received a \$13.4 million face value increase to a firm fixed-price contract for QF-106 drones.

In March 1990, Sperry Corporation, Honeywell Defense Avionics Systems Division, Albuquerque, New Mexico, was awarded a \$13.1 million contract face value increase to a firm fixed-price contract for QF-106 full-scale aerial target air vehicles. The contract was completed in October 1992. This was for 48 QF-106s. Contract Number F08635-86-C-0180

In December 1989, AEL Industries Inc received an initial award on a \$25 million contract for QF-106 avionics. The contract was awarded by Honeywell Defense Avionics Systems Division to the AEL Defense Corporation subsidiary. The second option was exercised in late 1990. This phase of the contract is valued at \$5.9 million, and

calls for the conversion of an additional 48 F-16 aircraft. The program's work is carried out at the AEL Aero Division facility at St. Louis Regional Airport, East Alton, Illinois. The contract, with options, is valued at \$25 million.

Sperry Corporation was awarded a \$17.9 million contract in August 1989 for 48 QF-106 drones. These systems were to be delivered by late 1991. Contract Number F08635-86-C-0180

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Mid	1980s	US nears completion of F-106 Delta Dart service phase out
	1986	Conversion program from F-106s commenced
	1989	QF-106 production contract issued
	1991	Program continuing
	1992	No procurement in this fiscal year
Late	1993	QF-106 procurement concluded/deliveries continuing
	1994 ^(a)	QF-106 deliveries completed

^(a)estimated

Worldwide Distribution

The United States is not expected to export the QF-106 drone. The US government could allow the companies involved to perform similar conversions for other countries, such as those in the NATO alliance or certain close allies in the Middle East and Asia, where aircraft are available.

User Country(s). The **United States** is presently the exclusive operator of the QF-106 drone.

Forecast Rationale

Production of the QF-106 full-scale aerial target concluded in 1994, with the last units being delivered in the fourth quarter of that year. This fleet will remain in operational service until their numbers are exhausted or the expense of maintaining this system becomes prohibitive, although the former is likely to occur before the latter.

Eventually, the QF-106 will be superseded by a next generation FSAT – the QF-4E. This new system is aimed at meeting the full-scale aerial target needs of all three US armed services. All three services should be using the new QF-4E by the end of the next century's first decade.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Missile	(Engine)	thru 98	High Confidence Level			Good Confidence Level			Speculative			Total 99-08	
			99	00	01	02	03	04	05	06	07		08
HONEYWELL DEFENSE SYSTEMS													
QF-106(a)	J75	181	0	0	0	0	0	0	0	0	0	0	0
Total Production		181	0	0	0	0	0	0	0	0	0	0	0

(a)Pratt & Whitney J75 engine program ended series production in 1964.