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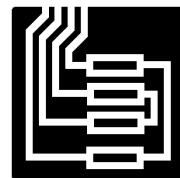
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## McDonnell Douglas F/RF-4 Series

### Outlook

- Turkey has opted to purchase F-16s instead of upgrading its F-4E fleet
- BAE Systems is converting mothballed F-4s to target drones for the U.S. Air Force

**Note:** Icons indicate area(s) of current and potential retrofit/modernization activity



### Orientation

**Description.** Dual-seat, twin-engine, all-weather fighter/strike aircraft. RF-4 is a multisensor reconnaissance version.

**Licensee.** Mitsubishi Heavy Industries Ltd, Tokyo, Japan (F-4EJ).

**Current Status.** McDonnell Douglas production ended in 1979; Japanese licensed production ended in 1981.

**Total Produced.** Through 1981, 5,195 aircraft were produced, including 127 license-produced by Mitsubishi.

**Application.** Fighter, attack, reconnaissance, defense suppression.

**Price Range.** Surplus F-4Es with modifications, approximately \$6.75 million. Japanese F-4EJ upgrade, \$12.5 million; Phantom 2000 upgrade, approximately \$8 million.

### Contractors

#### Prime

**Boeing Integrated Defense Systems**

<http://www.boeing.com>, PO Box 516, St Louis, MO 63166 United States, Tel: + 1 (314) 232-0232, Fax: + 1 (314) 777-1096, Prime

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### Technical Data

(F-4E)

Metric

U.S.

Dimensions

## McDonnell Douglas F/RF-4 Series

	<u>Metric</u>	<u>U.S.</u>
Length overall	19.20 m	62.98 ft
Height overall	5.02 m	16.47 ft
Wingspan	11.77 m	38.61 ft
Wing area, gross	49.2 sq m	530.0 sq ft
<b>Weight</b>		
Empty	13,757 kg	30,328 lb
Max T-O weight	28,030 kg	61,795 lb
<b>Performance</b>		
Max level speed(a)	Mach 2+	Mach 2+
Ferry range	3,184 km	1,718 nm
Service ceiling(b)	16,580 km	54,382 ft
<b>Propulsion</b>		
Two General Electric J79-GE-17A turbojets		
Thrust (each) with afterburning	79.6 kN	17,900 lbst

**Armament**

One M61A-1 gun mounted in nose. On four semi-recessed mountings under fuselage and four underwing mountings can be found four Sparrow, Sidewinder, Falcon, Shrike, or Walleye missiles; or two Bullpup missiles. Alternative loads of up to 7,250 kilograms (15,983 lb) of bombs and stores can be carried on seven attachments under the wings and fuselage. These include nuclear and conventional bombs, laser designator pods, land mines, rocket packs, ECM pods, gun pods, camera pods, spray tanks, and tow targets.

(a) With external stores.

(b) Supersonic

## Program Review

**Background.** The McDonnell Douglas F-4 Phantom II is one of the most successful military aircraft of all time. Nearly 5,200 of these aircraft were produced between 1960 and 1981, and nearly 1,000 Phantom IIs remain in inventories worldwide.

The F-4 was originally developed as a fleet air defense fighter for the U.S. Navy. The aircraft's mission was later changed to missile fighter. The prototype F4H-1 first flew in May 1958, and the first production F-4 was

delivered in December 1960. The aircraft was called Phantom II to distinguish it from an early McDonnell jet fighter. Trials in a ground attack role led to U.S. Air Force orders for the aircraft.

During the past 15-20 years, a number of F-4 operators launched programs to extend the useful service lives of their Phantom IIs. Most operators, however, have since replaced their F/RF-4s with more modern equipment.

## Variants

**F-4A.** Initial version. Powered by General Electric J79-GE-2 engines. TF-4A designation used for F-4As converted to trainer configuration.

**F-4B.** USN/USMC all-weather fighter. Powered by J79-GE-8 engines. QF-4B and DF-4B designations used for drone and target conversions.

**RF-4B.** Reconnaissance version of F-4B.

**F-4C.** USAF fighter. Powered by J79-GE-15 engines. First flew in May 1963. EF-4C conversions for defense suppression role.

**RF-4C.** Reconnaissance version of F-4C.

**F-4CCV.** Designation used for one experimental aircraft.

**F-4D.** Improved version of F-4C for USAF. EF-4D conversions to qualify for F-4G Wild Weasel program.

**F-4E.** Multirole fighter powered by J79-GE-17 engines. First production E flew in June 1967. Used to perform air superiority, close support, and interdiction operations.

**F-4EJ.** Japanese version of F-4E.

**RF-4E.** Reconnaissance version of F-4E. First flew in September 1970.

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**F-4F.** F-4 version ordered by West Germany.

**F-4G.** Improved version of F-4B for U.S. Navy with ASW-21 communications equipment. Most later restored to B configuration. Initial flight in March 1963.

**F-4G (Advanced Wild Weasel).** Modified F-4Es for defense suppression role.

**F-4J.** Improved version of F-4B for U.S. Navy and U.S. Marine Corps. Powered by J79-GE-10 engines.

**F-4K.** Improved version of F-4B for Royal Navy (U.K.). Powered by Rolls-Royce Spey engines.

**F-4M.** Produced for Royal Air Force (U.K.). Similar to K configuration. Some delivered with dual controls for use as trainers.

**F-4N.** Modified F-4Bs for U.S. Navy.

**F-4S.** Modified F-4Js for U.S. Navy. Features airframe and electronics improvements.

**F-4T.** Improved air defense/interceptor concept. Never produced.

**QF-4.** Modified F-4 for remotely controlled, unmanned operation. Used for full-scale aerial targets.

## Funding

Most recent F/RF-4 funding was \$100,000 for modifications to USAF aircraft in FY97.

## Milestones

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
May	1958	Initial flight of prototype F4H-1
Dec	1960	First production F-4 delivered (to USN)
May	1963	Initial flight of F-4C
Mar	1965	First flight of RF-4B
Jun	1967	First flight of production F-4E
Oct	1979	U.S. production ended
May	1981	Last F-4 completed (by Mitsubishi)

## Worldwide Distribution/Inventories

<b>Operator</b>	<b>Designation</b>	<b>Quantity</b>	<b>Average Age</b>
Egypt Air Force	F-4E	25	33.00
Germany Air Force	F-4F	59	34.50
Greece Air Force	F-4E	35	33.50
Greece Air Force	RF-4E	22	35.00
Iran Air Force	F-4D	15	43.00
Iran Air Force	F-4E	29	36.00
Iran Air Force	RF-4E	3	34.00
Japan Air Force	F-4EJ	73	31.50
Japan Air Force	RF-4E	27	31.00
Korea Republic of (South) Air Force	F-4D	50	44.50
Korea Republic of (South) Air Force	F-4E	64	33.75
Korea Republic of (South) Air Force	RF-4C	16	35.00
Turkey Air Force	F-4E	112	36.83
Turkey Air Force	RF-4E	38	38.50

## McDonnell Douglas F/RF-4 Series

## Identified Retrofit &amp; Modernization Contractors

## Electronics

<b>BAE Systems Inc</b>	http://www.na.baesystems.com, 1601 Research Blvd, Rockville, MD 20850-3173 United States, Tel: + 1 (301) 838-6000, Fax: + 1 (301) 838-6925, Email: na.marketdevelopment@baesystems.com (Target Drone Conversion)
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## Related News

**Iran Tests New Air-to-Air Missile** – In 2008, Iran successfully tested a new, unnamed air-to-air missile, one that is strikingly similar in appearance to the U.S.-built AIM-54 Phoenix. It should be noted that a small number of Phoenix missiles were supplied to Iran prior to the 1979 revolution.

During the test, this new missile was fired from an Iranian F-4 Phantom II fighter and hit an aerial target drone. (FI, 12/08)

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## Opportunities

Turkey had announced plans to upgrade an additional 48 F-4Es indigenously, but now appears set to purchase F-16 fighters to replace its F-4 fleet.

**ELECTRONICS**

**Turkish Upgrade Program.** In 2004, Israel Aerospace Industries completed a \$1 billion upgrade of 54 Turkish F-4Es in a project that included installation of a new fire control radar and new EW system, computers, armament, and nav gear. The first 26 aircraft were modernized in Israel by IAI, with the remaining 28 aircraft being upgraded by the local No. 1 Air Supply and Maintenance Center Command under supervision of IAI.

Turkey subsequently announced plans to upgrade an additional 48 aircraft to F-4E 2000 standard in a project focusing more on modernizing the aircraft's avionics systems; the country's Defense Industries Undersecretariat (SSM) decided that the upgrades

would be performed by Turkish Aerospace Industries (TAI) under guidance from IAI. According to the SSM, the work could be performed for about \$300 million if handled by the Turkish industry, compared with \$600-\$700 million if contracted out to IAI.

For the time being, Turkey has halted further negotiations on upgrading the additional 48 F-4Es. The Turkish Air Force (TAF) has begun to evaluate the interim purchase of additional F-16s as an alternative to upgrading its F-4Es prior to its expected procurement of 100 F-35s over the next decade.

**Target Drone Conversion.** In 2006, BAE Systems received a \$25.1 million contract from the USAF for the provision of 20 QF-4 full-scale aerial targets. BAE will modify previously mothballed F-4 Phantoms into QF-4 target drones at its facility in Mojave, California, and at Tyndall Air Force Base, Florida. Production of all 20 QF-4s was scheduled for completion by year-end 2008.

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# FI's Opportunity Outlook

ELECTRONICS													
		High Confidence				Good Confidence			Less Confidence				
Status	Thru 2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total	
Estimated Potential Candidates	546	<b>Target Drone Conversion &lt;-&gt; F-4 &lt;-&gt; United States &lt;-&gt; Air Force</b>											
<b>Planned/In Progress</b>	20	0	0	0	0	0	0	0	0	0	0	0	
<b>Speculative</b>		5	5	0	0	0	0	0	0	0	0	10	