

KAI T-50



Photo Credit: Korea Aerospace Industries

[Editor's Note: This feature is excerpted from the full program profile available to subscribers of the Aviation Week Intelligence Network, awin.aviationweek.com.]

The T-50 is an advanced jet trainer (AJT) produced by Korea Aerospace Industries (KAI) in partnership with Lockheed Martin. KAI has subsequently designed multiple variants to fulfill lead-in fighter trainer and light-attack requirements.

Program History

In the early 1990s, South Korea sought to expand its aerospace industry. Under the Peace Bridge II program, Lockheed Martin agreed to open a production line for F-16s in Korea. Hundreds of South Korean engineers were trained in the United States in preparation for domestic F-16 production and Lockheed Martin committed to a series of offset agreements including the

development of a new AJT designated as the KTX-2. Lockheed Martin viewed the aircraft as an opportunity to provide an AJT to complement the F-16. Lockheed Martin's responsibilities under the KTX-2 program were to develop the aircraft's avionics and flight control software, and to provide KAI with technical assistance.

The Korean Ministry of National Defense (MND) approved development of the KTX-2 in November 1991. The South Korean Government agreed to fund 70% of the KTX-2's \$2.1 billion development cost, with 17% and 13% provided by Samsung (later KAI) and Lockheed Martin, respectively. The KTX-2 experienced a tumultuous development, with numerous suspensions and near cancellations. The project was further complicated by the 1997 Asian financial crisis, which led to the consolidation of South Korea's aerospace industry under a single company in 1999. The KTX-2 design was finalized in 1999 prior to being re-designated as the T-50 in 2000 in honor of the 50th anniversary of the Republic of Korea Air Force (ROKAF). KAI completed work on its first prototype on Oct. 31, 2000, and flew the AJT for the first time on August 2, 2002.

Features and Variants

KAI and Lockheed Martin originally envisioned creating three variants of the T-50: a baseline AJT, Lead-in Fighter Trainer (LIFT) and a light attack aircraft (LCA).

T-50 Baseline Advanced Jet Trainer

While about half its size, the T-50 shares significant design elements with Lockheed Martin's F-16. The design features a blended wing-fuselage, fore-body strakes and a single General Electric

Spec Showcase: FA-50

Empty Weight.....14,300 lb.
 MTOW.....27,300 lb.
 Length.....43.1 ft.
 Height.....15.8 ft.
 Wing Span31 ft.
 Wing Area.....225 ft.²

Max Speed.....1,140 mph
 Ceiling.....55,000 ft.
 Range.....1,150 mi.
 Stores.....10,000 lb. on 7 hardpoints and 1 x 20mm
 M197 three-barrel rotary cannon



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F404-GE-102 engine producing 17,700 pounds (lbs.) of thrust. The T-50 is one of the few supersonic AJTs in operation that is also capable of +8/-3G maneuverability performance. However, the T-50s exceptional handling qualities come at the cost of some instructional design characteristics such the lack of a greatly elevated rear seat to facilitate flight instruction.

T-50B Flight Demonstration Aircraft

In the spring of 2010, the ROKAF ordered ten T-50B aircraft for service with the Black Eagle flight demonstration team. The T-50B shares the T-50's airframe, but also includes two wingtip-mounted smoke generators and a fuselage-mounted camera. KAI delivered its first T-50B on May 25, 2010, and concluded deliveries by 2011.

TA-50 Lead-in Fighter Trainer

The TA-50 was developed as a LIFT platform to ease the transition between AJT and F-16 conversion training phases. The TA-50 is equipped with an internally mounted M197 20mm cannon – a three-barreled derivative of the M61 Vulcan cannon, Elta EL/M-2032 mechanically scanned array (MSA) radar, and additional external armament options. Lockheed Martin initially wanted the TA-50 to feature its APG-67 MSA radar, but KAI instead settled on the Israeli EL/M-2032. The TA-50 has seven external pylons that can accommodate a maximum of 10,000 lbs. of ordnance, including the SUU-20 practice bomb dispenser, AGM-65 Maverick, Mk 82 500 lb. general purpose bomb, AIM-9 Sidewinder, and a 150-gal. external fuel tank. Operators of the TA-50 often use the aircraft as a light attack platform in addition to a LIFT trainer.

FA-50 Light Attack Aircraft

The FA-50 was designed as a dedicated LCA platform and originally was designated as the A-50. The FA-50 is distinguishable from the TA-50 by its tail, which has been shortened to 15.8 ft. (4.82 meters) from 16.2 ft. (4.94 meters) and widened. The FA-50 incorporates the same features as the TA-50 but adds an Elistra radar warning receiver (RWR) and countermeasure dispenser system (CMDS) as well as the Link 16 data link and night vision imaging system. The FA-50's MIL-STD-1553 databus and stores management system also can accommodate the Joint Direct Attack Munition (JDAM), Wind Corrected Munitions Dispenser (WCMD) system and other precision-guided munitions. KAI has marketed the FA-50 as an affordable alternative to high-end fighter aircraft in the aerial policing and light attack roles.

Taurus Systems, the consortium of MBDA and Saab that builds the Taurus KEPD 350 bunker-buster stand-off munition, has proposed developing a compact variant initially for the F-35. A potential follow-on development program called the KEPD 350K2 could equip the FA-50 and KAI KF-X fighter.

T-50A U.S. T-X Offering

For the T-50A, Lockheed Martin has added a large touchscreen

display, wide-angle head-up display (HUD), displacement stick, and an embedded, live virtual constructive training system that leverages the company's experience with the F-22 and F-35 programs. The design also features a modular aerial refueling receptacle that can be installed or removed as needed, limiting the additional maintenance burden for the capability.

Production and Delivery History

KAI produced four prototypes as part of the development phase, not including static test airframes. The first T-50 prototype flew on Aug. 2, 2002, for 40 min. Over 180 T-50s are currently in service and 16 more are on order with five countries:

- South Korea: 50 T-50s, 22 TA-50s, 10 T-50Bs and 60 FA-50s with all aircraft delivered. Order for additional TA-50s is expected.
- Indonesia: 16 TA-50s, all delivered.
- Philippines: 12 FA-50s, all delivered.
- Iraq: 24 FA-50s, 8 of which had been delivered by April 2018.
- Thailand: 12 TA-50s with, 4 of which have been delivered as of April 2018. Four more are expected.

Other countries that have expressed interest in the T-50 include:

- United States: 350 T-50As for the T-X program.
- Botswana: eight FA-50s to replace its fleet of F-5s.
- Peru: as many as 24 FA-50s to replace its fleet of aging A-37Bs.

South Korea

The ROKAF is the largest T-50 operator globally with 140 aircraft in service as of December 2017. Their fleet includes 49 T-50s, 22 TA-50s, 8 T-50Bs and 60 FA-50s. The T-50s and TA-50s prepare ROKAF pilots for the F-15K and KF-16.

The MND signed a contract for 25 T-50s in December 2003. KAI subsequently began serial production of the T-50 the following year. KAI delivered the first T-50 to the ROKAF in December 2005. The MND signed for a second batch of 47 T-50s with KAI in October 2006 that included 25 T-50 AJTs and 22 TA-50s. The ROKAF received all 22 TA-50s between 2011 and 2012. In December 2011, KAI was awarded a contract for \$600 million to produce 20 FA-50s. In May 2013, KAI was awarded a follow-on contract worth \$1 billion for 40 additional FA-50s, which were delivered by 2017. In September 2017, the MND unveiled plans to procure an undisclosed additional number of TA-50s aircraft to serve as lead-in trainers for the F-35.

Indonesia

In 2011, Jakarta signed a \$400 million deal with KAI for 16 TA-50 aircraft, locally designated as T-50i trainers. Deliveries occurred from September to January 2014. In December 2015, the TNI-AU lost a single TA-50 during an aerial display at Adipsupjito

airbase. Both the pilot and co-pilot failed to eject and were killed.

Philippines

On March 28, 2014, Philippine Air Force (PAF) signed a \$400 million contract with KAI for 12 FA-50 light fighters. KAI delivered the first two aircraft in November of 2015, and the remaining aircraft by June 2017. The PAF locally designates its T-50 variant as the FA-50PH.

In January 2016, the PAF announced a \$2.25 million tender to acquire 20mm cannon ammunition for its FA-50 fleet. The PAF is expected to order additional armaments for its FA-50 fleet including air-to-air and air-to-ground weapons. The Raytheon AGM-65 Maverick is the most likely air-to-ground option as both KAI and PAF FA-50 models at the 2017 Asian Defense & Security (ADS) exhibition were fitted with AGM-65s.

Thailand

In September 2015, Thailand ordered four TA-50 (T-50TH) aircraft for \$110 million. A second batch of eight aircraft was ordered in 2017 for \$258 million. KAI is expected to complete

deliveries of Thailand's first batch of T-50 jet trainers by March 2018. Thailand took delivery of its first pair of T-50THs on Jan. 25, 2018. The second batch of T-50s is expected to arrive by 2020. As of the time of this writing, Royal Thai Air Force (RTAF) personnel—pilots and technicians—are in South Korea, learning to fly and maintain T-50s.

Thailand may order a third batch of four T-50 aircraft to fulfill its original requirement for 16 AJTs. The T-50s will replace L-39 trainers that are due to be decommissioned after some 30 years of service. The RTAF operates about 35 L-39s, the survivors of 40 ordered in the 1980s, as lead-in fighter trainers. Four more orders are expected.

Iraq

In November 2013, Iraq ordered 24 FA-50s, locally designated as T-50IQ. This designation reflects their intended use as training aircraft, but they are fully up to the FA-50 standard. Deliveries began in February 2016 and are expected to run through 2019. Eight had been delivered by April 2018.

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