

# Freedom Fighting at Fifty: Supporting the F-5 in Europe

ABD ONLINE

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*A stalwart at both European air shows and squadron training bases, the F-5 Freedom Fighter is in service on the Continent with three air forces. Specialist maintenance, repair, and overhaul (MRO) companies are ensuring that these venerable airframes remain airworthy.*

Although the F-5 Freedom Fighter was designed in the 1950s, variants remain in service with air forces around the world. Three countries in Europe continue to use this twin-engine supersonic jet, chiefly as a trainer and a display aircraft – namely, the air forces of Spain, Switzerland, and Turkey. In total, these air forces operate 159 F-5 variant aircraft, including F-5A/B, F-5E/F, and F-5M types. The F-5A was the baseline single-seat aircraft from which the two-seat F-5B was developed. Although the “Alphas” originally were built without a radar system, many were later upgraded with the Emerson Electric AN/APQ-153 system.

The Northrop (now Northrop Grumman) F-5E was an outgrowth of the legacy F-5A/B model, fitted with General Electric J85-21 engines and a longer fuselage to accommodate more fuel compared to the previous F-5 models. Moreover, this aircraft’s wings were slightly redesigned to improve maneuverability, and its avionics were modernized. The two-seat variant of the F-5E was designated as the F-5F. The F-5M variant of the aircraft is an upgrade of the F-5E that adds new avionics to the aircraft, allowing it to use a larger number of weapons compared to the F-5E, plus a Selex Griffon-F radar.

## **IN SPAIN**

The Ejército del Aire (Spanish Air Force) currently has a fleet of twenty F-5M aircraft. These are deployed with the Spanish Air Force's 231st and 232nd Squadrons, both based at Badajoz/Talavera la Real air force base in southwestern Spain. The Spanish Air Force expects to retain its F-5 aircraft in service for some time yet. In order to enhance their life expectancy, Spain's F-5s will undergo a structural upgrade program. The work for this program, which was announced in November 2011, will be performed at the facilities of the European aerospace and defense specialist Cassidian (formerly known as EADS Defence and Security) at the company's factory in Getafe on the outskirts of the Spanish capital Madrid. Cassidian has a long history of involvement with Spain's F-5s.

The company, which was known as CASA before its takeover by EADS Defence and Security, commenced working on the aircraft in 1980 and continues to do so today. "We have more than 30 years of experience on this aircraft," noted Francisco Salido, Senior Manager for Media Relations at Cassidian's Getafe site, speaking in April. Not only has the company been involved in the MRO of the Spanish F-5s, but it also was involved in their production. CASA was tasked with manufacturing the F-5 locally under license from Northrop. To this end, it built seventy airframes, notably the single-seat RF-5 reconnaissance aircraft, which the Spanish Air Force no longer uses, and the two-seat F-5B. These aircraft equipped the Spanish Air Force and also were exported to Botswana. Salido says that Cassidian is able to manufacture all of the aircraft's structural parts, including its wings and airframe components. Moreover, he says that the company can perform all the work necessary to certify an F-5 as airworthy.

Nevertheless, the F-5 can be a challenging aircraft to maintain. "The main challenge is to get the spare parts," Salido explains. "Our source for spare parts is the aircraft's original manufacturer (Northrop Grumman) and also the major contractors who built the aircraft's subsystems." The aircraft's technical documentation is supplied by the Spanish Air Force in conjunction with Northrop Grumman. For the future, Salido has not ruled out Cassidian expanding its F-5 MRO services. Several air forces continue to operate the F-5, including the U.S. Air Force, which is joined by its Brazilian, Kenyan, Mexican, Singaporean, and Taiwanese counterparts, to name just a few.

## **SWISS EFFORTS**

Switzerland's F-5 fleet currently comprises fifty-three F-5E and F examples. Several of these aircraft serve with the country's famous Patrouille Suisse (Swiss Patrol) aerobatics team of the Swiss Air Force, which has used the aircraft since 1995. The Swiss Air Force's 16th Squadron uses the two-seat F-5F, with the 6th and 19th Squadrons operating the single-seat F-5E. These three units are deployed at Payerne air force base in western Switzerland. The MRO for the Swiss Air Force's fleet of F-5 aircraft is provided by RUAG Aviation, a Swiss aerospace and defense company. Like Cassidian, RUAG Aviation was involved in the initial production of the Swiss aircraft. Beat Pfister, the Head of Global Business Jet and Missiles at RUAG Aviation, says, "The majority of (Switzerland's F-5s) were assembled, ground-tested, and flight-tested

at RUAG Aviation prior to their delivery to the Swiss Air Force. Therefore, the company had already begun its MRO tasks for the F-5 when the aircraft was delivered to the Air Force in 1982." According to Pfister, during the intervening 30 years, RUAG Aviation has steadily increased its F-5 MRO expertise "throughout all the aircraft's MRO tasks from its nose to tail, including component, engine, avionics, hydraulics, electrics, structural, and ejection seat maintenance, repair, and overhaul." He adds that RUAG Aviation's workshops can perform design and reengineering tasks for the aircraft "as well as new development and manufacturing." Nevertheless, the F-5 design is over 50 years old, and this does bring challenges, Mr. Pfister notes, particularly in regard to ongoing sustainment and obsolescence of parts. "The F-5 has no life limitation as per the damage tolerance design principles that were used during the development of this aircraft. Therefore, a challenging aspect is to have enough life data and technical documentation, as well as engineering expertise and adequate design tooling, to support this. RUAG Aviation has collected usage data regarding the F-5 since the aircraft's introduction into the Swiss Air Force." In addition to being able to manufacture F-5 spare parts at its own facilities, the company procures components "from known spare parts brokers, spare parts manufacturers, and the U.S. Air Force." One of the attractions of the F-5 is that it is a comparatively easy aircraft to maintain. For example, the tail and horizontal stabilizer section of an F-5E/F can be separated from the rest of fuselage by simply removing the bolts securing this section, without needing to use hydraulic jacks. The wings are similarly easy to remove during maintenance and are secured to the fuselage with bolts. The engines can be moved into and out of the aircraft on overhead rails inside the rear fuselage. RUAG Aviation not only provides MRO services for Swiss jets, it also performs similar work for customers around the world operating the F-5E and F models. The company signed a contract with Northrop Grumman in November 2010 to provide global sustainment and logistical support for the F-5 as part of the aircraft's original manufacturers' Worldwide Sustainment Team. Today, Mr. Pfister says that his company "supports almost all air forces around the globe with F-5 MRO, modernization, and upgrades." While RUAG Aviation offers MRO services for the aircraft's engines, airframe, avionics, subsystems, and software, the Astronautics Corporation of America, based in Milwaukee, which also is a member of Northrop Grumman's Worldwide Sustainment Team, provides avionic support for the aircraft's flight instruments and flight management equipment. In particular, the company supports the CPU-129/A Flight Director Computer that the firm was tasked to develop by Northrop Grumman for the F-5E/F, although it also supports a host of other avionics systems used by the aircraft. Astronautics Corporation of America has been in business since 1959, though one of its subsidiaries, Kearfott, can trace its roots back to that company's founding in 1917 during the early days of aviation. The parent corporation claims that its products are in service on over 150,000 aircraft across the world. For its part, Northrop Grumman supports these and other members of the Worldwide Sustainment Team through its, "unparalleled knowledge of the aircraft," among other efforts, according to official literature discussing such initiatives.

## **TURKISH F-5S**

By far the largest European F-5 operator is Turkey, which possesses sixty NF-5A/B-2000 combat models and sixty-nine T-38A/M aircraft (the latter is the designation used for the trainer version of the F-5 airframe). These jets are deployed with the Turkish Air Force's 133rd and 134th Squadrons based at Konya air force base in central Turkey and with the 121st Training Squadron at Izmir air force base on the western coast of the country. The MRO of these aircraft is the responsibility of Turkish Aerospace Industries, which is based in the country's capital Ankara. The firm performs the depot-level maintenance of the NF-5A/B-2000 and T-38A/M fleet, along with the MRO of the aircraft's engines. Turkish Aerospace Industries also was selected in 2007 by the Turkish government's Undersecretariat for the Defense Industries to implement an avionics modernization program for the Turkish Air Force's T-38A/Ms. The installation includes head's-up and multifunction color displays, a digital video data recorder and transfer system, hands-on-throttle-and-stick controls, and a cockpit intercom and new very/ultra high-frequency communications system, alongside a number of other avionics modernizations.

## **FIT AT FIFTY**

At present, the F-5 remains in service with over twenty air forces around the world. Despite its age, the aircraft shows no sign of retiring and is expected to stay in service for some years yet. With a rugged and capable design that accurately mimics the attributes of multirole combat aircraft used throughout the world, thanks to its supersonic performance, the F-5 remains an excellent trainer. In fact, RUAG Aviation predicts that it will be well placed to serve the world's F-5 community over the coming decade and expects "to grow its F-5 business throughout the next 10 years and beyond."