Information regarding the Lockheed F-104 Starfighter

TF-104 Two-seater

An article published in the Zipper Magazine # 51

September-2002

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1. TF-104 TWO-SEAT STARFIGHTER

1.1 Introduction

By U.S. Air Force standards, the two-seat trainer is a necessary tool for safe and efficient pilot training. The TF-104 is a fighter, which serves double duty as a trainer. It has all the flight characteristics of a single-seat Starfighter. It flies as fast, and as high, and it climbs as quickly. It carries the same fire control, communication and navigation systems as the F-104.It can fly missions with Sidewinders, unguided rockets and bombs-yet it fulfils all requirements for f-104 transition, systems, and proficiency training. Two-seat TF-104's permit substantial savings of time in training the squadron's instructor-pilots. They are practically dispensable at the squadron level for transition and proficiency training, and for check flights.

Both cockpits of the TF-104 have the controls and instrument displays of the single-seater. As a trainer it can be flown from either cockpit; as a fighter it is flown from the front cockpit.

In combat mission capability, the only concession the two-seater makes is hat it has no provision for the rapid-fire cannon or for centre-line stores.

1.2 Transition training

Pilot training experience, both in the U.S. Air Force and at Lockheed, demonstrates that the two-seater can make a substantial reduction in number of flight-hours required for transition training. This timesaving is particularly significant when it is necessary to train a number of pilots quickly. It also means substantial savings of training cost. Transition training is a continuous requirement. U.S. Air Force experience indicates an annual pilot replacement rate of approximately 15%, due to retirement or promotion to non-flying duties.

1.3 Proficiency training

A pilot who has completed his transition training is familiar with his weapon and its potential, but he is not yet combat-ready. Combat readiness means proficiency, and this can only be attained through flight practice. When a squadron pilot scores low in certain weapon delivery missions, or has trouble in mastering fire control or navigation techniques, the quickest, safest, and most efficient means of correction is supervised flight in the two-seater. This allows the instructor to coordinate actual demonstration with his verbal explanation. Certain proficiency training such as radar navigation is difficult to acquire by any other method.

The instructor can watch both the radar display and the ground while the student flies from the radar.

New pilots and techniques, new weapons, systems, and mission assignments involve constant proficiency checks if the squadron is to maintain its combat-ready status. For this reasons it is recommended that each squadron of 18 Starfighters include two TF-104's.

1.4 Differences between F-104 and TF-104

As mentioned earlier the two-seat Starfighter as now configured has no shackle for centreline stores nor does it carry a gun. The gun and ammunition compartments are used for internal fuel tanks and electronic gear-components, which must be moved to make space for the second seat. The nose landing gear on the two-seater retracts aft instead of forward.

There are minor differences in oxygen and air conditioning systems capacities, in antenna mounting positions, and the two-seater does not include an automatic pilot. The TF-104 has switch-actuated relays which allow either pilot to take over control of individual electronics systems from the other. In the event of an emergency in either cockpit, even including ejection of one of the occupants, the other pilot can immediately take over direction of the aircraft with the full use of electronic navigation, communication, and identification systems.

The intercom system permits continuous communication between cockpits.

While the TF-104 can be flown from either cockpit at any time, only the front cockpit has the entire sighting, armament selection, arming and firing controls required for weapon delivery.

The reason for this is that only the front cockpit can be equipped with a sight. Therefore the front cockpit is the student's position and the instructor occupies the aft cockpit. From the aft cockpit the instructor can monitor all of the instruments and most functions of the fire control system. The instructor has override control on all firing, bomb release, arming and jettison circuits so that he can prevent firing of any weapon and he can jettison stores in an emergency.

More than 75% of all spare parts are interchangeable between the two models, and more than 85% of all Aerospace Ground Equipment. This applies to ground equipment which is peculiar to the F-104 airplane series; all standard Air Force ground equipment such as electrical carts, hydraulics and oxygen service units, etc. is applicable to both single-seat and two-seat models.

1.5 Combat mission capabilities

In its normal configuration, the TF-104 can carry Sidewinders or fuel tanks on the wing tips; or Sidewinders, rocket pods, bombs or fuel tanks on the wing pylons. All air forces now operating or planning to operate Starfighters have included two-seat F-104's in their plan of operations. The U.S. Air Force even deploys its two-seaters overseas whenever a Starfighter squadron is ordered to some troubled area. The two-seater can be equipped with an aerial refuelling boom for long distance deployment flights. Obviously combat mission planning would be based on the capabilities of the single-seat Starfighter, rather than those of the TF-104. For this reason no attempt has been made here to include a full tabulation of the two-seater's mission capabilities. For purposes of rough comparison, however, the accompanying graph shows the TF-104's performance expressed in percentage of the single-seater's capabilities.