LOCK ON N°26
AIRCRAFT PHOTO FILE

Northrop F-5E/F TIGER II

Christophe DONNET
edited by Willy PEETERS

VP
the world in scale

928

Northrop F-5 E TIGERII

Surveillance Wing
Swiss Air Force
Payerne Air Base, Switzerland

VP
the world in scale

Front cover : With OFAEM (Swiss Air Force Logisitics Command) pilots at the controls, F-5F (Tailcode J-3202) returns from a test flight after a minor overhaul job. In June 1987, two Swiss Air Force F-5Fs were temporarily grounded following structural failure discovery around the cockpit area.

Title Page : Beautiful shot of J-3026 on a cross-country flight over breathtaking Swiss countryside. The two-tone gray camouflage scheme is very apparent in this view.

Page 3: More breathtaking scenery backing this F-5E (J-3082), on hold on a side-track and awaiting permission to proceed to the runway. In the background can be seen several civilian commuter aircraft, revealing the dual role of Sion Flugplatz. With only 14,68 meters in length, the F-5E is considered a small fighter to today's standard. Beige-painted exercise SIWA Sidewinder missiles, (active IR head, inert body) are carried on both wingtips. Note the open auxiliary inlet doors at the rear fuselage.

Published in Belgium by
VERLINDEN PUBLICATIONS nv
Ondernemersstraat 4
KMO-Zone Mallekot
B-2500 LIER/BELGIUM

Published and distributed in the United States by
VLS CORPORATION
811, Lone Star Drive
Lone Star Industrial Park
O'Fallon, Mo 63366
USA.
Tel. (314) 281-5700.
Fax (314) 281-5750.

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Photogravure : SCANBO/Beerzel Belgium
Printed by : Drukkerij DE PEUTER nv. /Herentals Belgium

ACKNOWLEDGMENTS

The author (also on behalf of VERLINDEN PUBLICATIONS) would like to express his sincere gratitude to the following Swiss Air Force and Anti-Aircraft Troops officers for their kind assistance while compiling this photographic report: Corps Commander Fernand CARREL, Swiss Air Force and Anti-Aircraft Troops Commander-in-Chief. Brigadier Christophe KECKEIS, Commander 31 Aviation Brigade; Colonel Bernard REVAZ, Senior Staff Officer; Major Alfred BOHNENBLUST, Instructor; Lieutenants Olivier QUELOZ and Roland SENN, Flying Officers.
Finally, a special thanks to Mr. Alain BURNIER, Sion Air Base Flight Line and Aircraft Repair Manager; Mr. Désiré CORDY and all mechanics of the Swiss Air Force Logistics Command (OFAEM).
Christophe DONNET

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Clearly state name and address when sending in your material.

INTRODUCTION

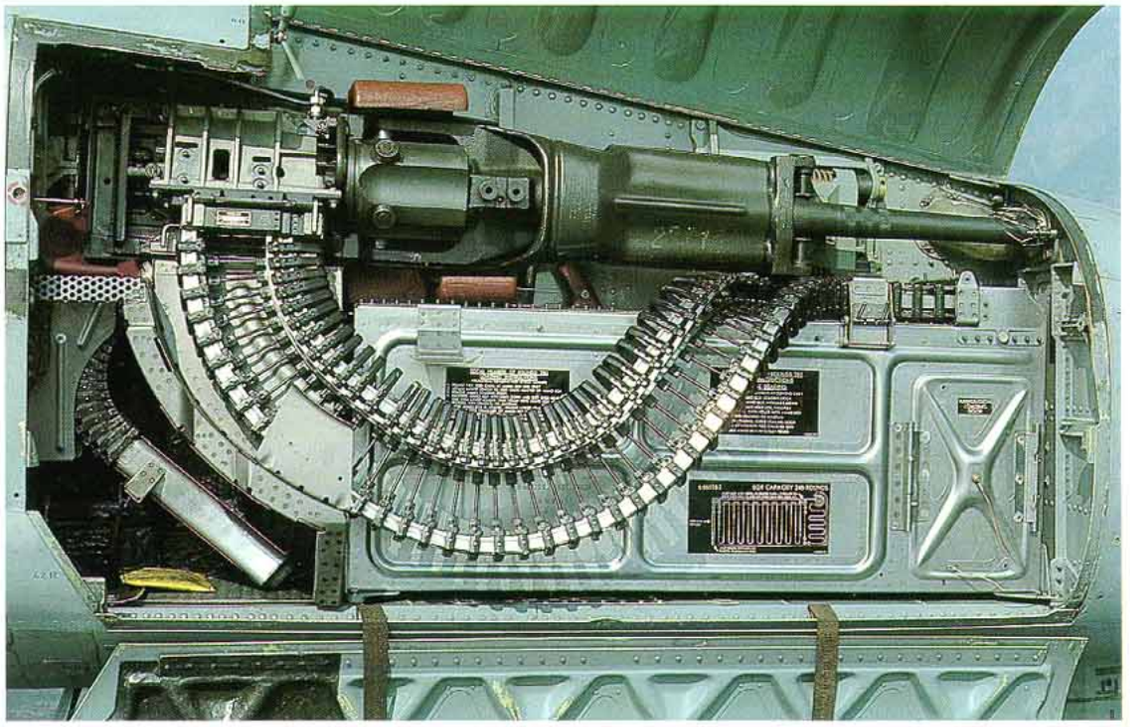
The initial goal of Northrop's private F-5 program was to build a fighter aircraft that was highly capable, relatively inexpensive, easy to fly and maintain. With the F-5E, they aimed for lucrative sales on the export market with favorable results. In fact, they had developed what a US Government study-in-progress indicated. The uprated F-5A, designated F-5E first took off on August 11, 1972, almost four months ahead of schedule and well below the estimated costs. Today, over twenty foreign air forces use it as a primary fighter.

Remarkably, the US Air Force never considered using the F-5E as a prime fighter because of its less sophisticated nature, but Agressor pilots are full of praise for the F-5 and prove its agility time and time again by beating F-14s, F-15s and F-16s in aerial combat.

Purchase of the F-5E and F-5F for the Swiss Air Force was approved by the Swiss Parliament on March 30th,1976 under a programme with the code name "Peace Alps". The first batch of 66 Northrop F-5Es were delivered from August 1978 to February 1981 (J-3001 to J-3066), including 6 dual-seat F-5Fs (J-3201 to J-3206). Northrop built the first 13 F-5Es and all the F-5Fs, delivering them inside C-5 Galaxies; the remaining 53 Tiger IIs were assembled from kits supplied to F+W factories. A second batch of 32 F-5Es (J-3067 to J-3098) and 6 F-5Fs (J-3207 to J-3212) were license-built in Switzerland by the F+W (except J-3067 itself) from mid-1983 to March 1985. These aircraft differ from the initial batch in having the LERX wing extensions and redesigned nose similar to the F-20 Tigershark. Ultimately, all F-5s were retrofitted with these update features.

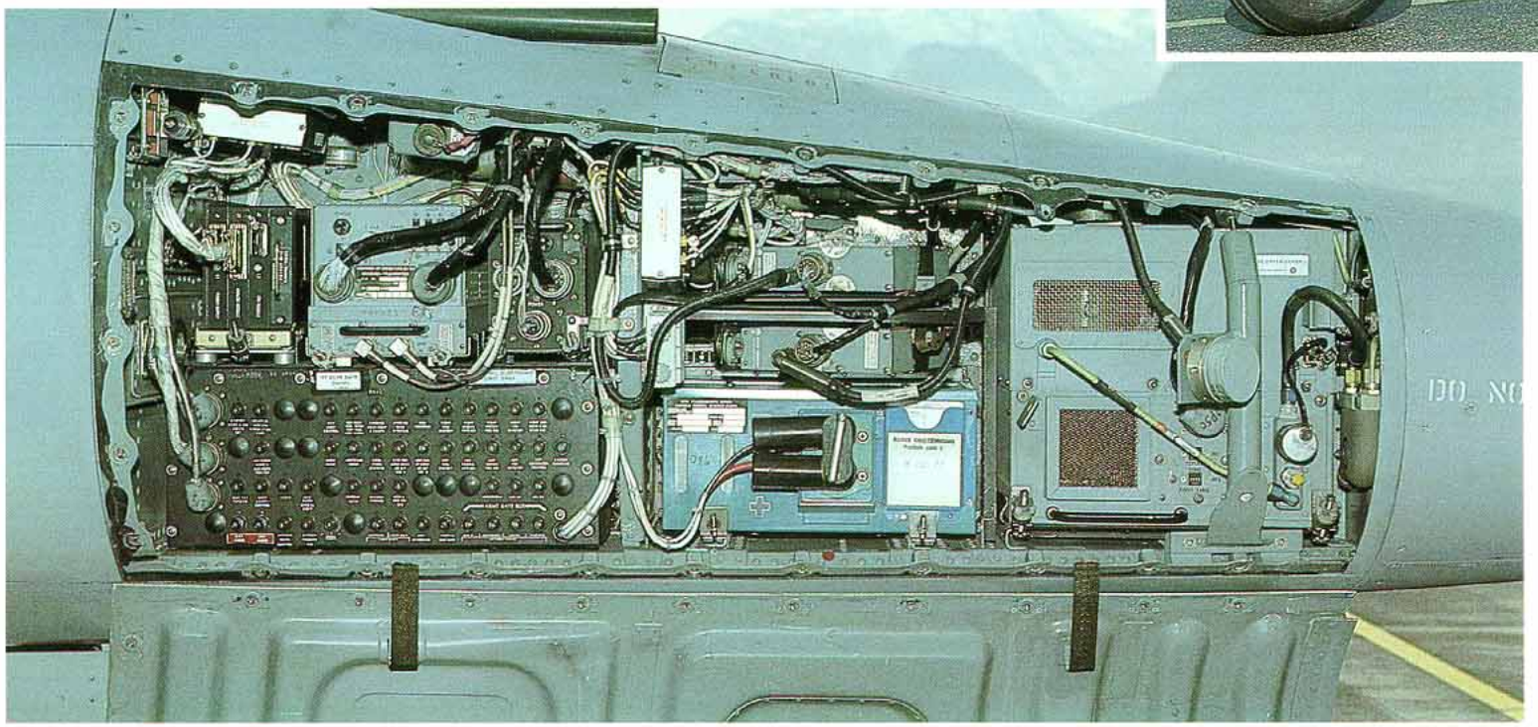
F-5E J-3082 proudly displaying the "TIGER" head of the "Fliegerstaffel 11", one of three official Tiger squadrons assigned to the Surveillance Wing. Nosewheel and main wheel doors can be seen lowered on parked aircraft as illustrated here. Also note the small auxiliary power unit in front of the starboard air intake, serving to reheat the radar equipment prior to a mission.

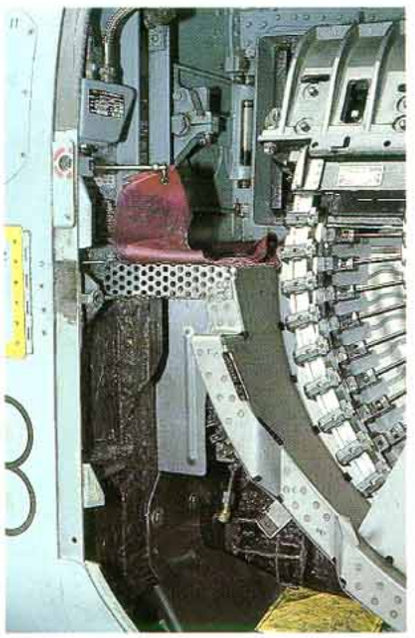
Swiss Air Force squadrons don't actualy "own" their aircraft which are inventoried by the OFAEM civil office. Clearly seen in this detail view is the badge of "Fliegerstaffel 19" carried on the starboard side, while opposite can be discovered unit markings of "Fliegerstaffel 13" (see page 16, top left photo). Also note the protective cover over the angle of attack vane transmitter on top of the rescue panel.

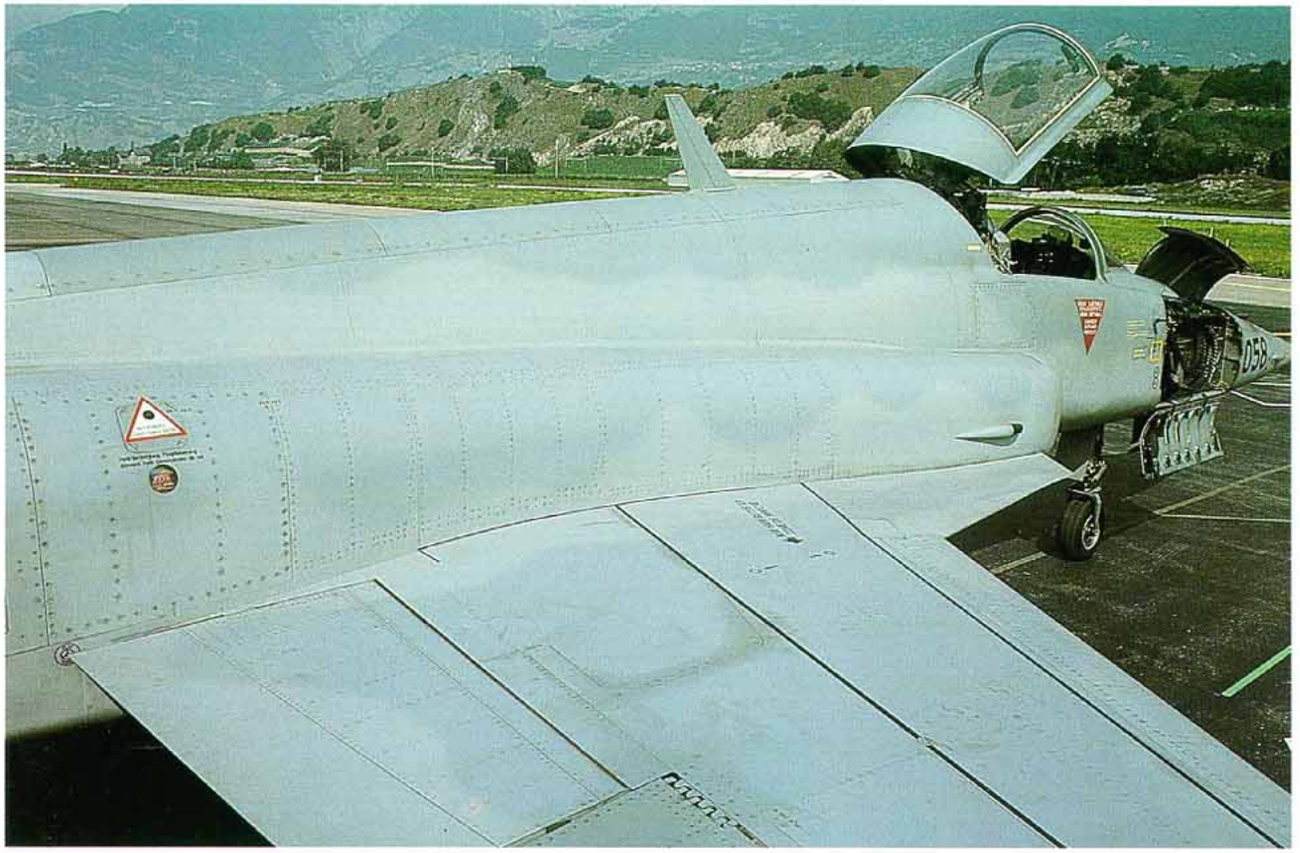


(Above) Installation of the 20mm Pontiac M39A2 cannons revealed, each able to fire 280 rounds of which 246 are stowed inside the ammo box below the gun. In peacetime, empty shells are retrieved in the black (mastic covered) box behind the gun (bottom right picture). Ammo speed is 1500 rounds per minute.

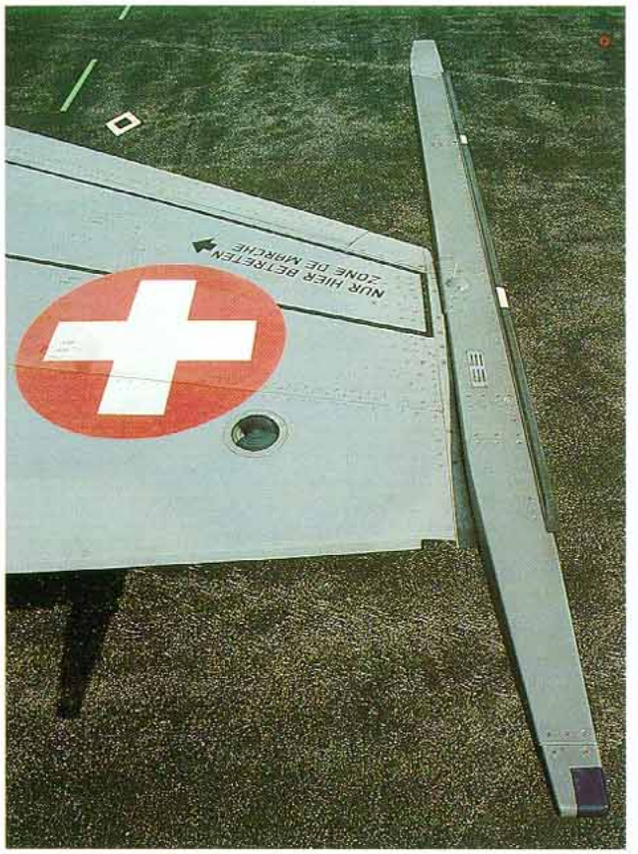
(Below) Starboard avionics bay with ESDA recorder and IFF system at left (on top of test panel). In the middle is the Radar Warning System amplifier and battery while most forward is the radar module with receiver antenna.







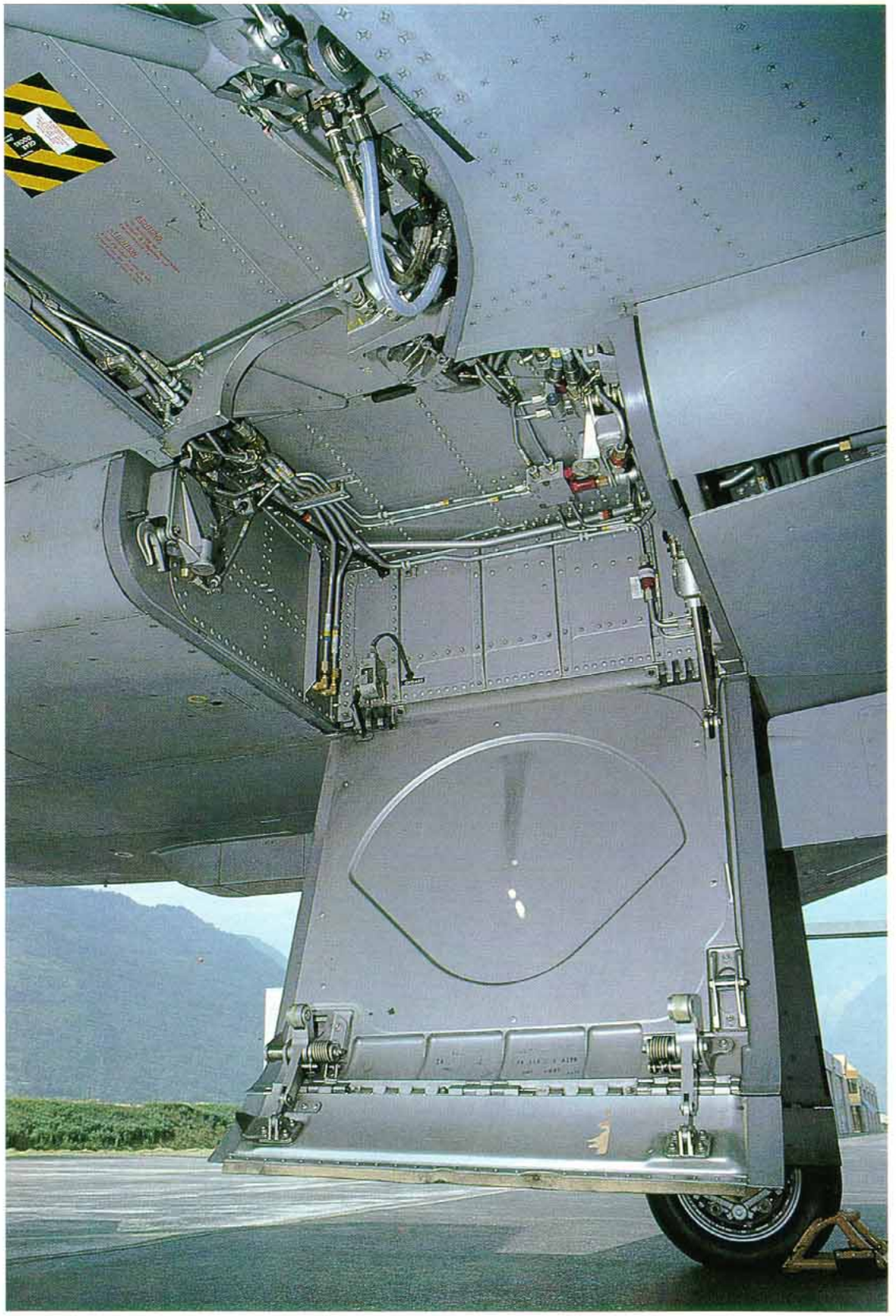
Spine and upper wing root detail clearly showing the forward LERX (or extended root fillet) for improved flight characteristics during high G-maneuvers and low speed handling. The red & white triangle marks the position of the flight system hydraulic tank. Note the black walkway demarcation on the wing.



The Sidewinder missile launch rail on the F-5E is not much different than with other aircraft except for the incorporation of an outboard formation light at the rear.

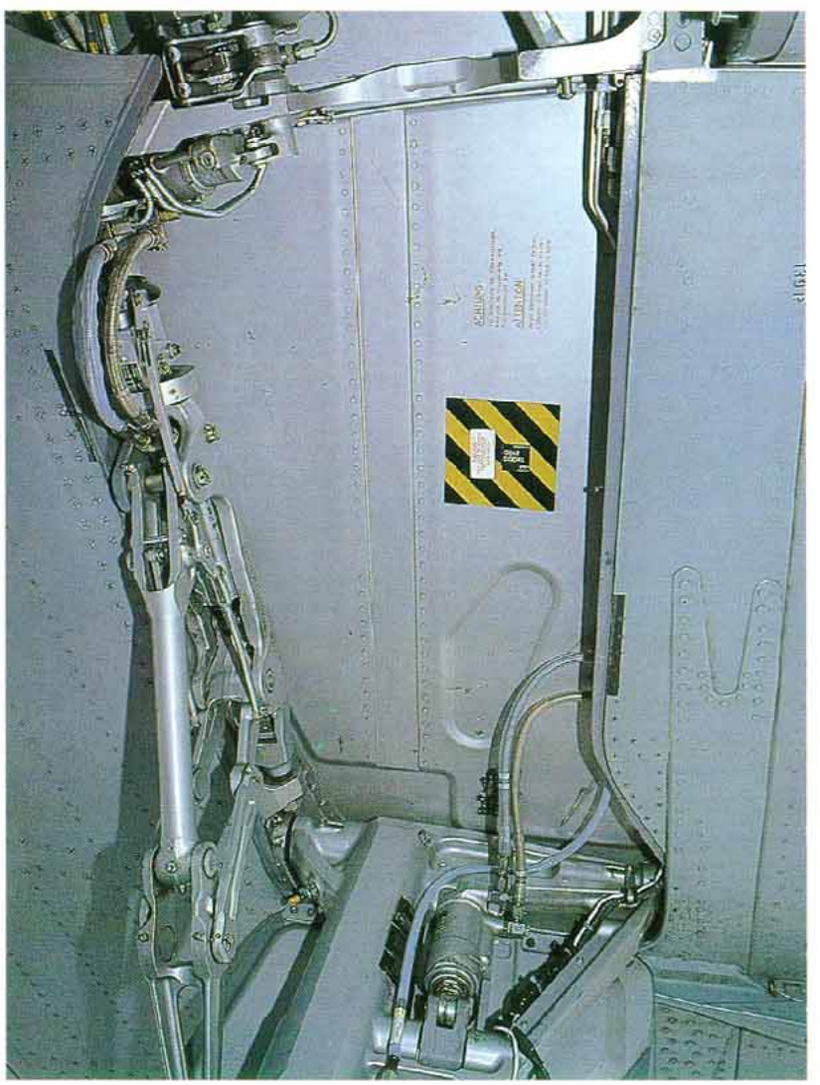
An improvement over the initial F-5A (F-5F wing shown) design was the installation of electrically operated leading edge flaps.

Close-up of the permanently mounted centerline pylon and open speedbrakes.



Wide-angle view of the immaculate starboard side main wheel well with split main gear door and dual locking mechanism. Note the retraction actuator at front.

Because of a narrow wing cross section ample space is available for the main gear and its retraction mechanism as shown in top and bottom photo.



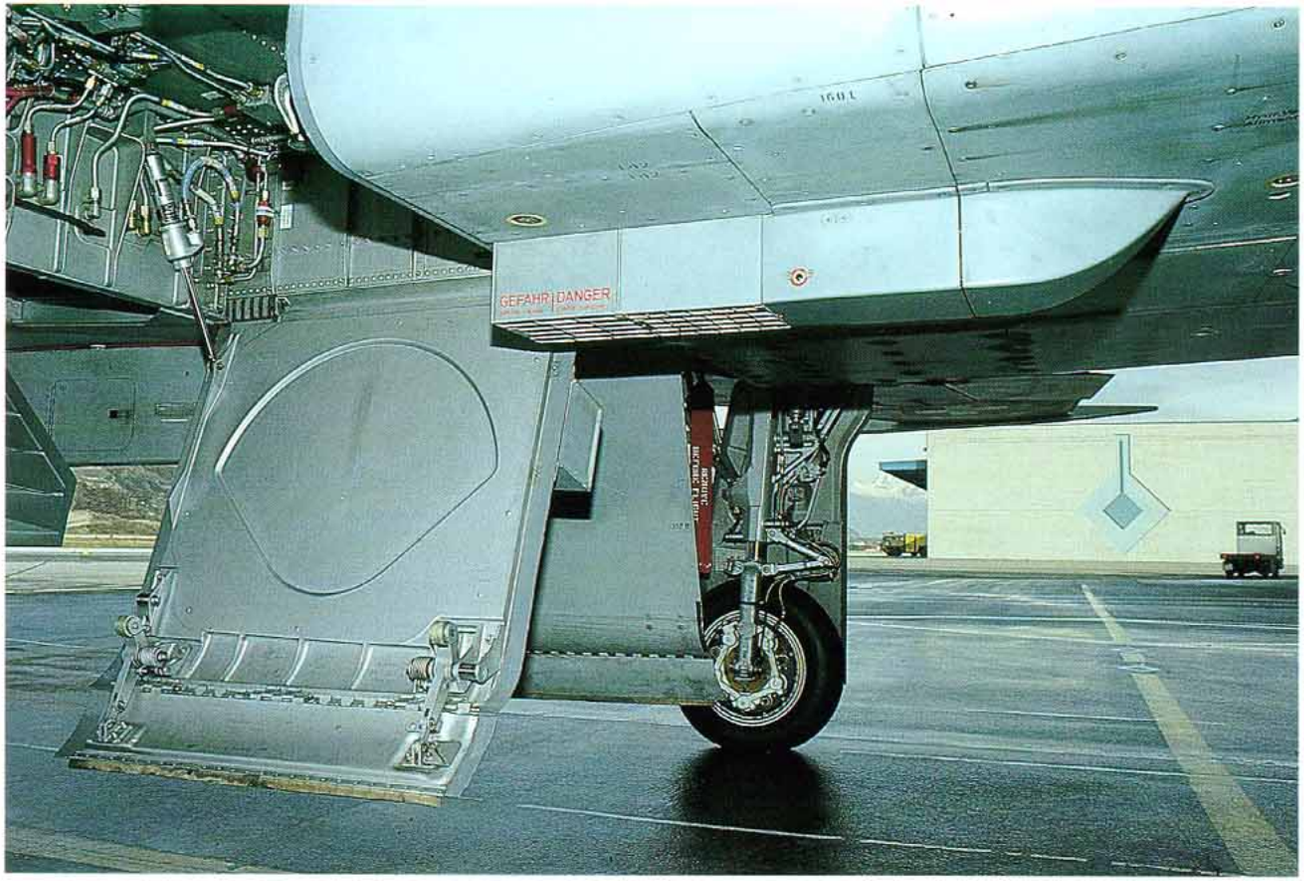
The limited performance of the early F-5A Freedom Fighter was upgraded by the installation of more powerful General Electric J-85-GE-21A turbojets, each capable of providing 1588 kg of thrust in military and 2268kg in full afterburner mode. Unlike other jets, the variable nozzle of the F-5E is enclosed inside the afterburner casing section as can be seen in the picture at right. Brake chute housing is on top and in between both exhaust pipes.

The Tiger's titanium plated exhaust area from below. The RWR antenna at the extreme aft of the fuselage is installed on both the F-5E and the dual-seat F-5F type actually shown here. The F-5F differs from the single-seat version in many ways, not only the much longer nose section for which a counterweight had to be installed below and in between the exhaust pipes (photo below).

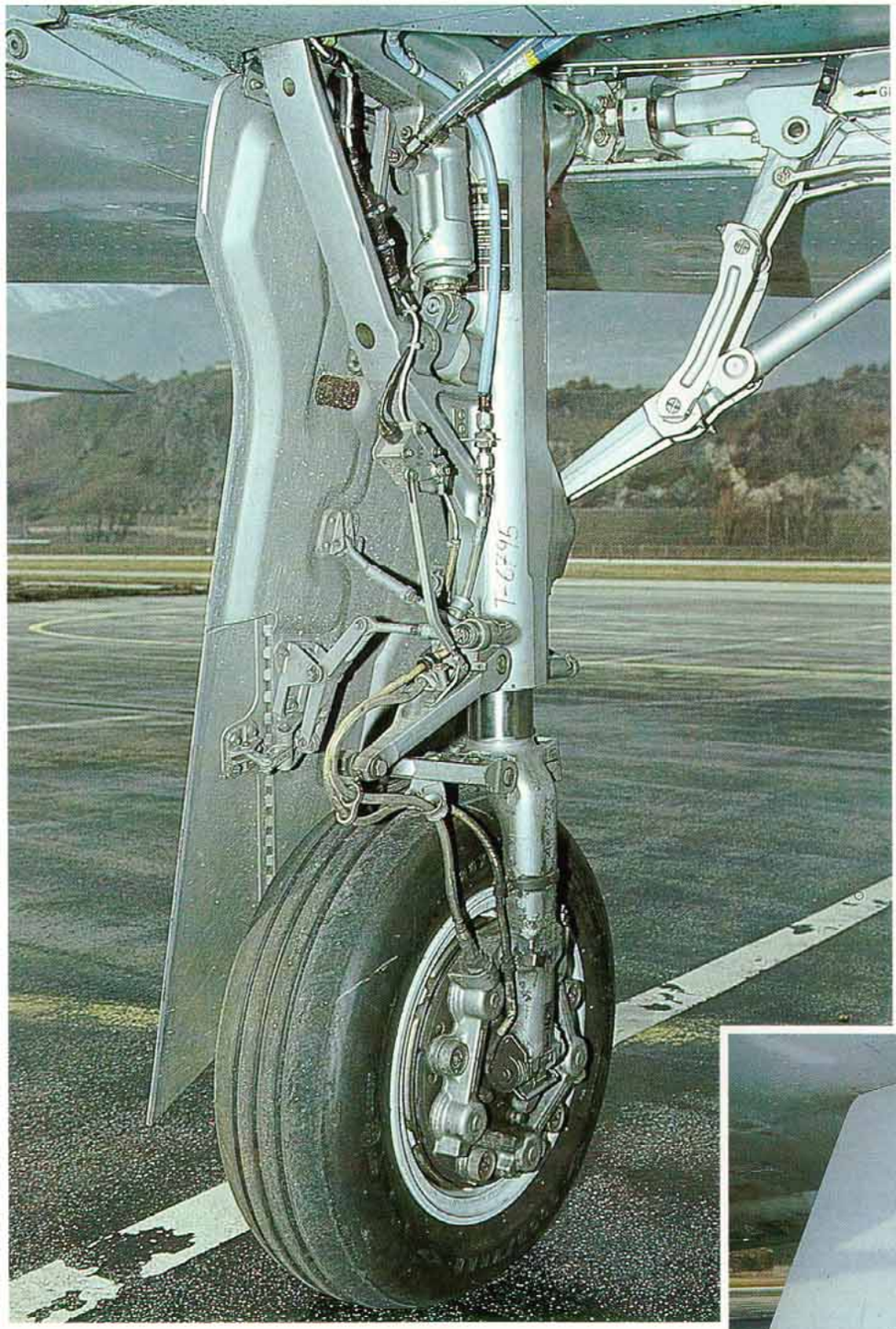
The auxiliary air intakes open automatically during engine cranking, take-off and at low speed performances to increase engine air flow.
Note all markings are in German and French, often complemented with inscriptions in Italian, the third of four Swiss national languages.
The maroon triangle at left, in front of panel 34R, instructs the use of the proper lubrication fluid.

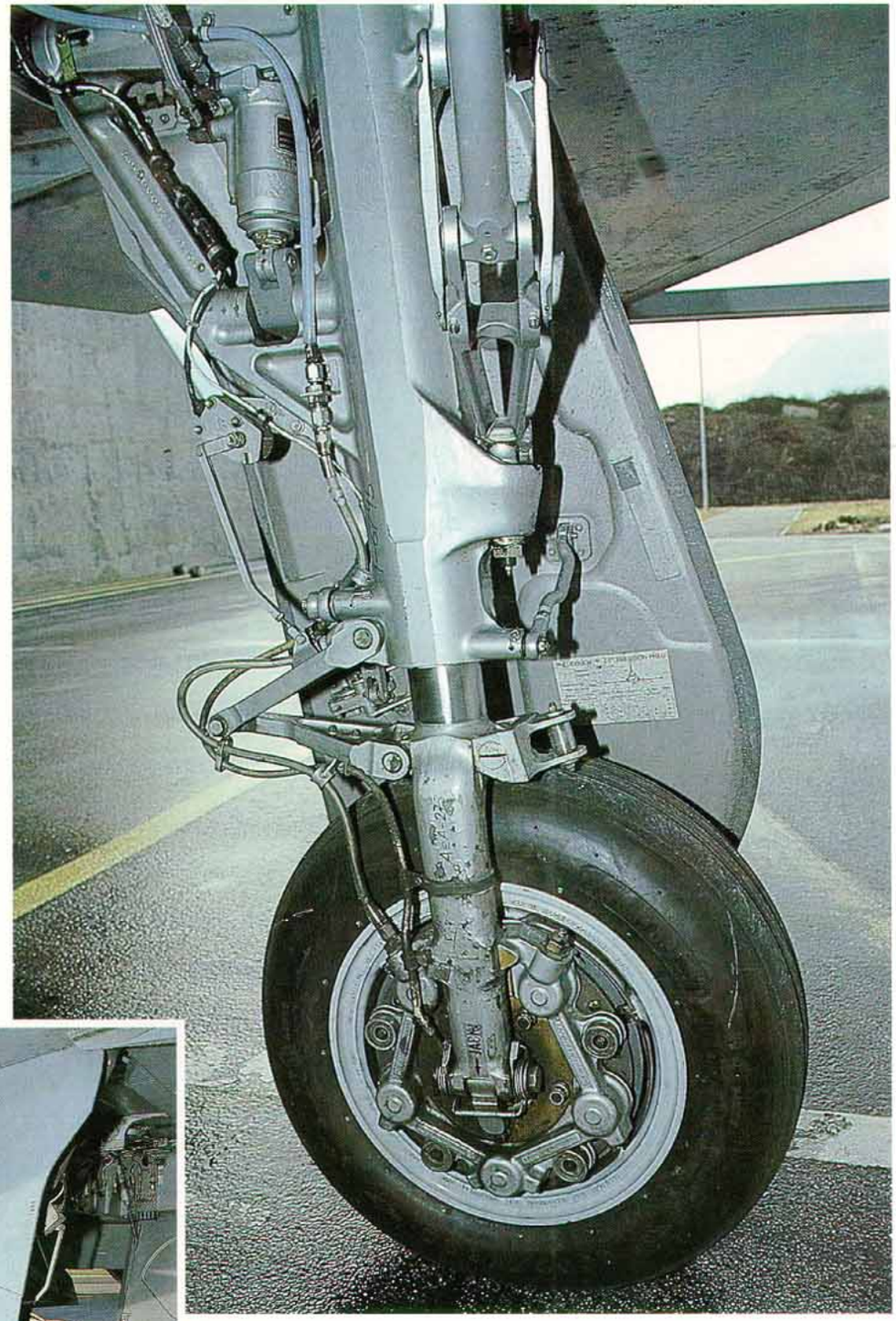
This 1050 liter ventral fuel tank is seldom used because of Switzerland's restricted airspace in which missions rarely exceed a 45 minute timeframe. Note the inside detail of the open airbrake.

Beautiful and very interesting overhead picture of the F-5Es fuselage section, perfectly showing the characteristic "coke-bottle" appearance of the fuselage, unlike the dorsal spine which gradually narrows towards the rear. The fuel filler caps for gravity replenishment of the main fuel tanks (forward on the dorsal spine on either side of the blade antenna) are normally not used as verified by the absence of fuel stains. Note the extremely thin vertical tail section.



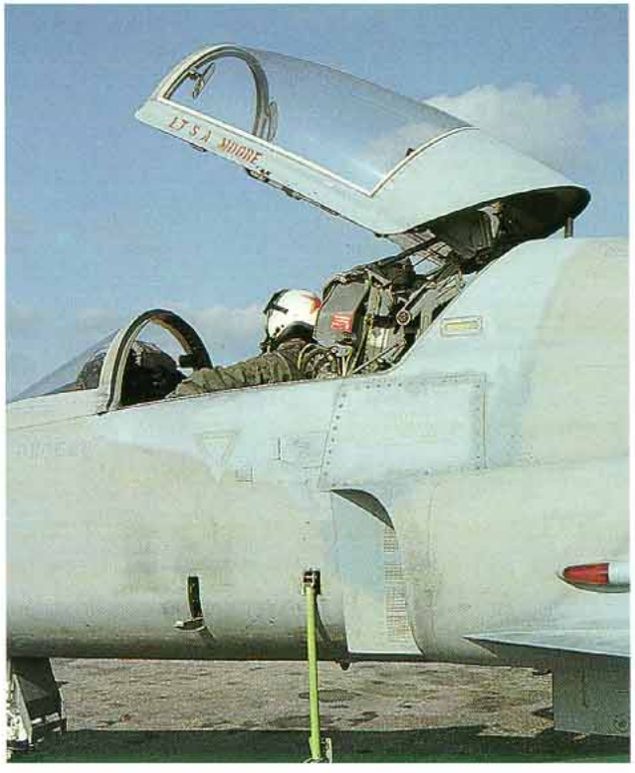
Swiss Air Force TIGER IIs are equipped with a chaff/flare dispenser, externally mounted on the bottom left fuselage, just aft of the main gear housing. Note that the forward part of the fairing is mounted on the main gear door. The inscription reads: DANGER, EXPLOSIVE CHARGE. The bottom hinge of the main gear door can clearly be seen on the starboard door in the picture above and on the port main gear door at right.





To facilitate operations from snow-covered runways (most likely to happen in this popular wintersport resort) or in heavy rain, the Swiss opted for larger main wheels with heavier brakes, equipped with a reliable anti-skid system. The main wheel leg, like the rest of the main wheel well, is dull aluminum overall. Note the hinged flap at the rear of the main gear door.

TIGER aircraft which feature ESDA ELM markings below the windscreen are fitted with structural and reactor fatigue recorders. Clearly visible in this view is the large VHF blade antenna on top of the dorsal spine. Although the F-5E is fitted with a built-in retractable step (as seen in the bottom left picture of a U.S.A.F. VFA-127 jet), Swiss pilots board their jets by an external boarding ladder hanging from the cockpit sill. Using the missile launch rail as a parachute rack is common practice with Swiss pilots.
A 300 kg inert practice bomb is fitted on the inboard pylon to simulate flight characteristics when carrying life bombs.
Note how the heavy load compresses the main wheel tire.

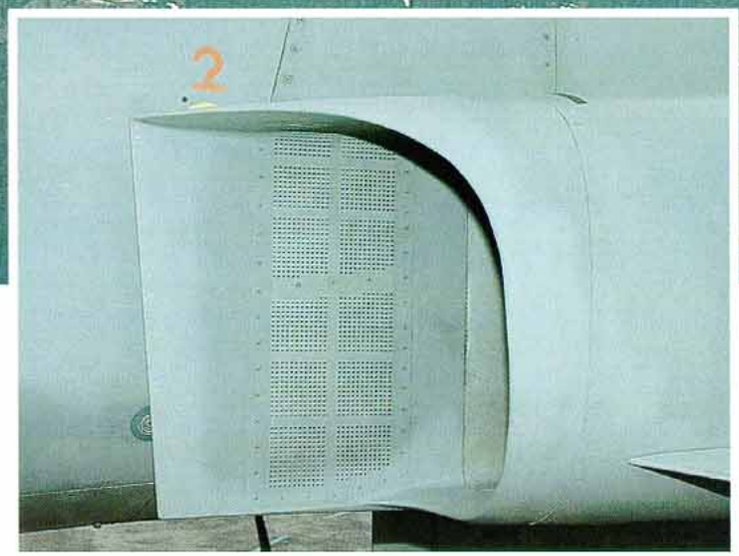


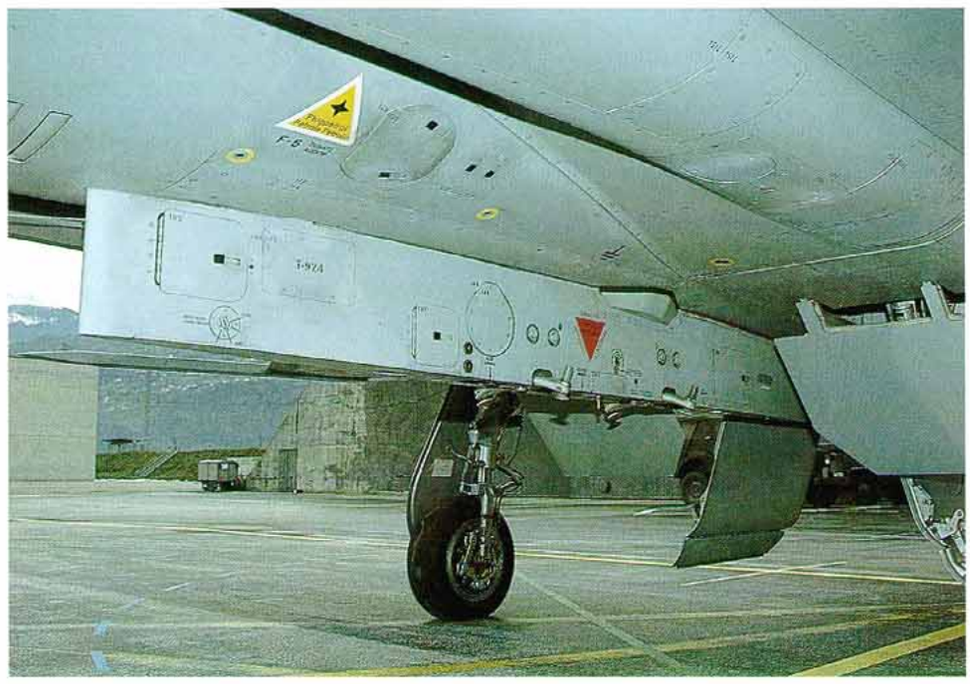
(Photo Zoltán BUZA)

(Photo Zoltán BUZA)

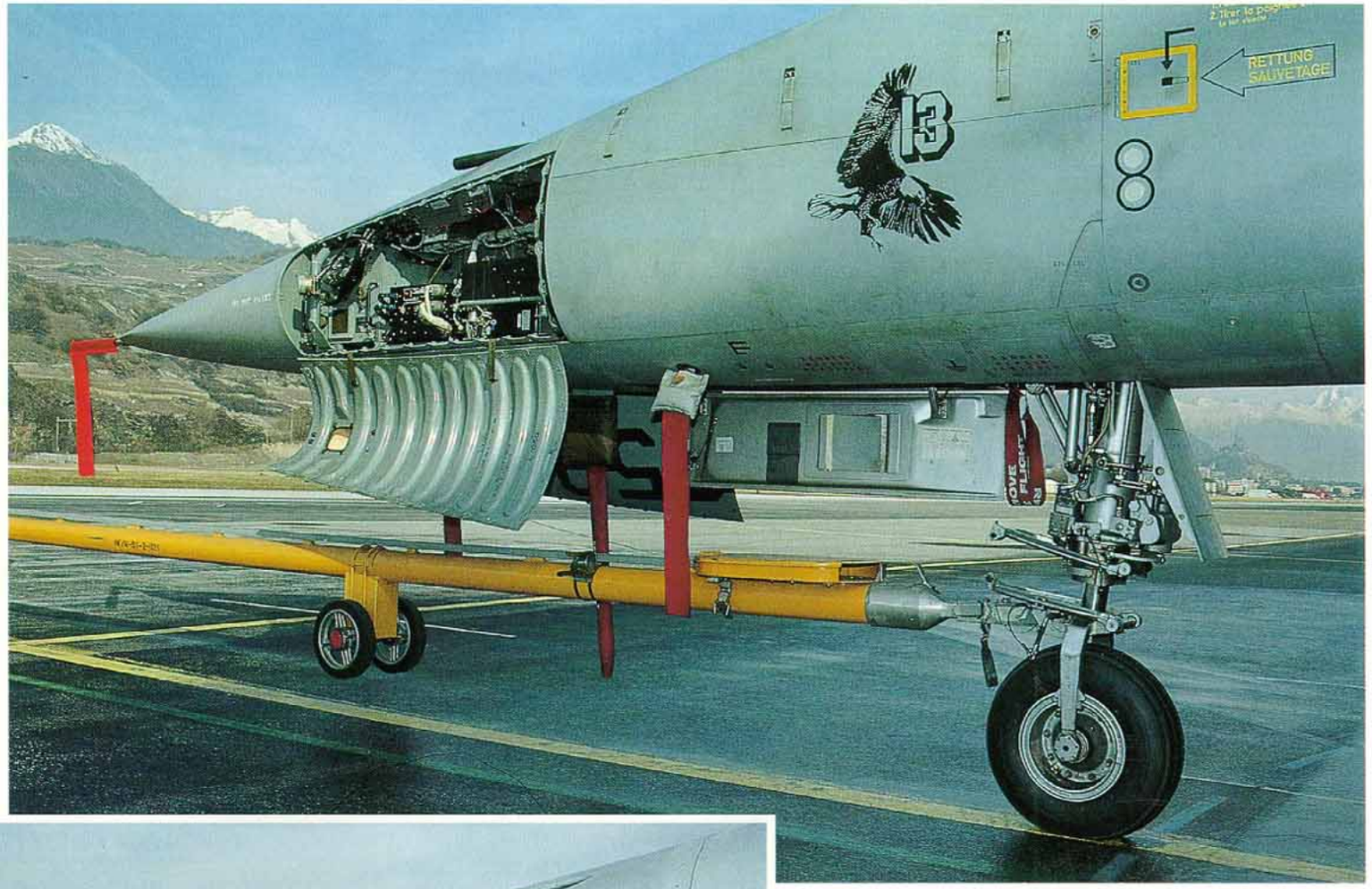
Ever since the Hawker Hunter withdrawal commenced, the "Escadrille d'Aviation 1" (N°1 Squadron) of the Surveillance Wing and "Fliegerstaffel 8", a reserve squadron, started using the F-5E for ground-attack duties as a secondary mission. Nevertheless, these ground-attack missions on F-5 were ceased at the end of 1993. This particular aircraft, J-3084, is equipped with a 1050 liter ventral fuel tank and two 300 kg inert bombs, while an inert Sidewinder missile is installed on the wingtip launch rail. Note the external power assembly is connected to the receptacle forward of the horizontal tailplane.

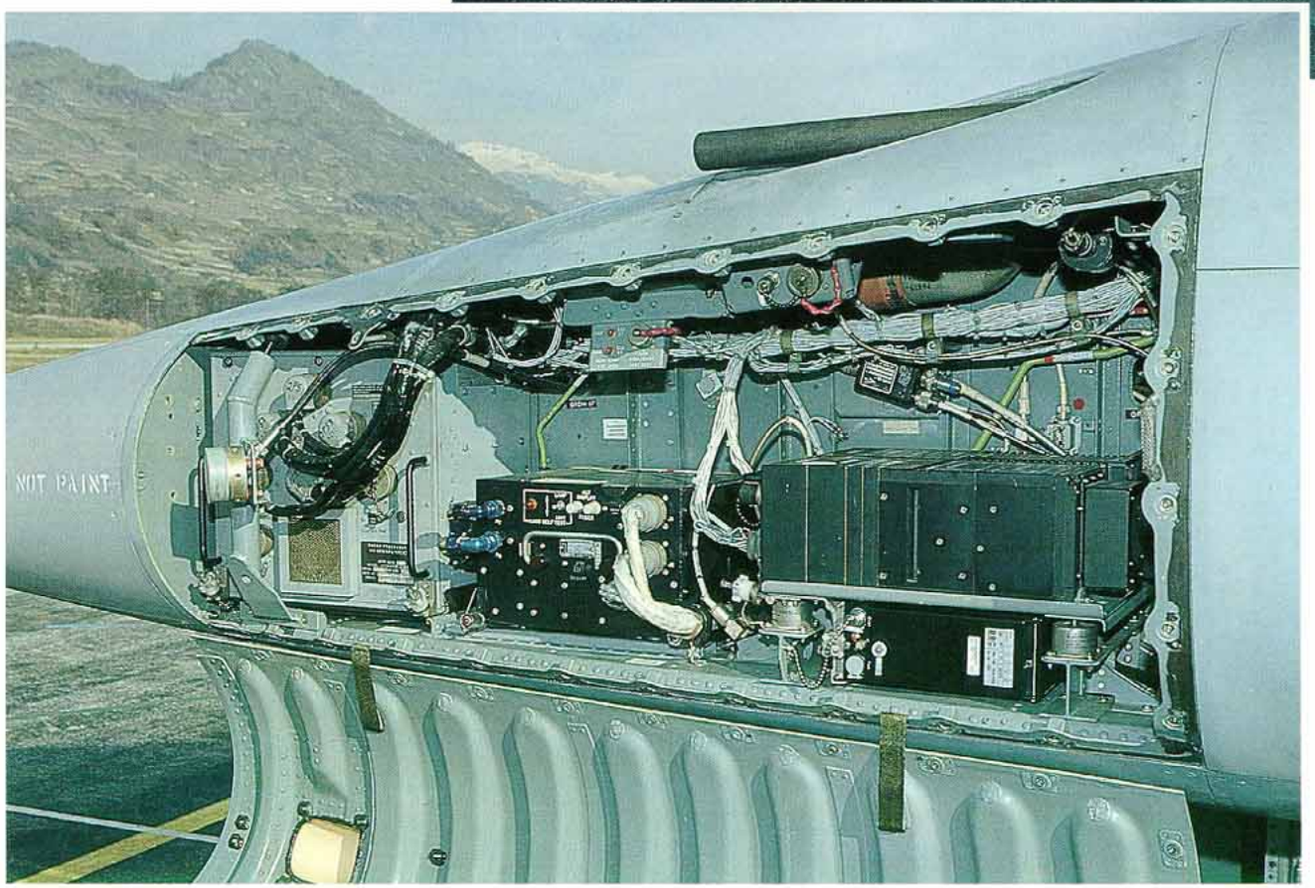
The photo at left reveals part of the interior canopy framing and the upper part of the ejection seat as installed in a US F-5E of VF-127 which is identical to its Swiss counterpart.





Forward visibility with the F-5E TIGER is excellent because of the frameless windscreen, very much appreciated by the pilots. The slender nose of this agile fighter is apparent in the main picture. Note the small Radar Warning Antenna radome just aft of the dissimilarly colored nose cone. Also very clear is the slightly overscaled, trilangual, ejection seat warning triangle.
The intake splitter plate is mounted some distance from the fuselage while the inner plate is perforated for airflow boundary layer control.
At right is the same area as shown on page 6 but from the opposite side.

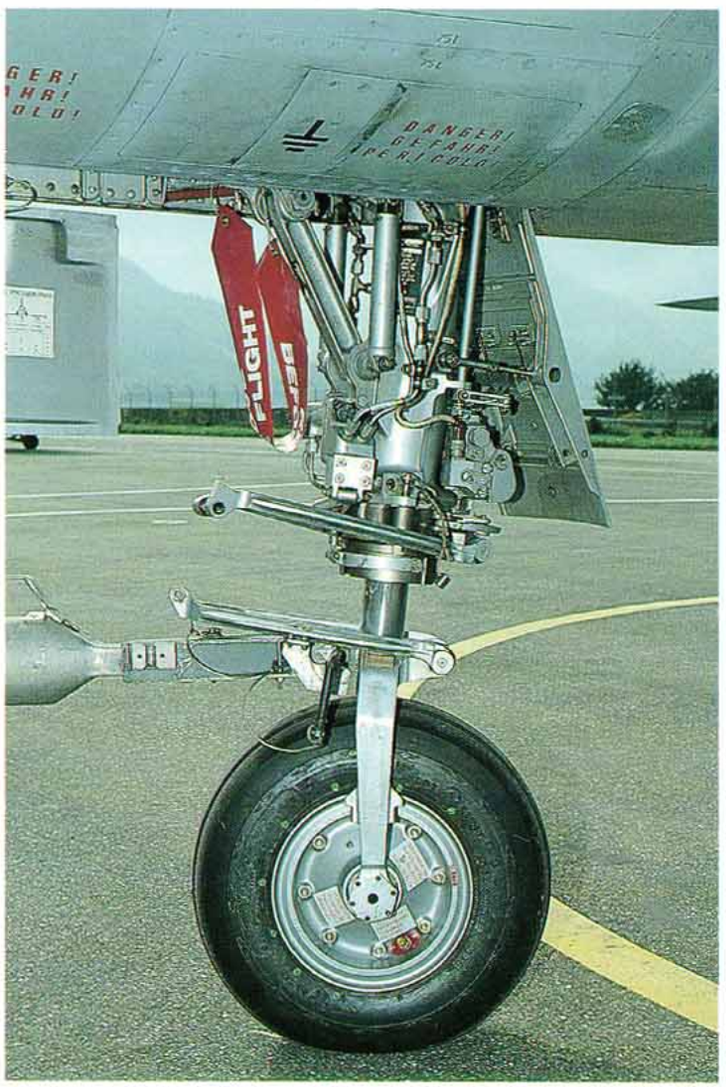


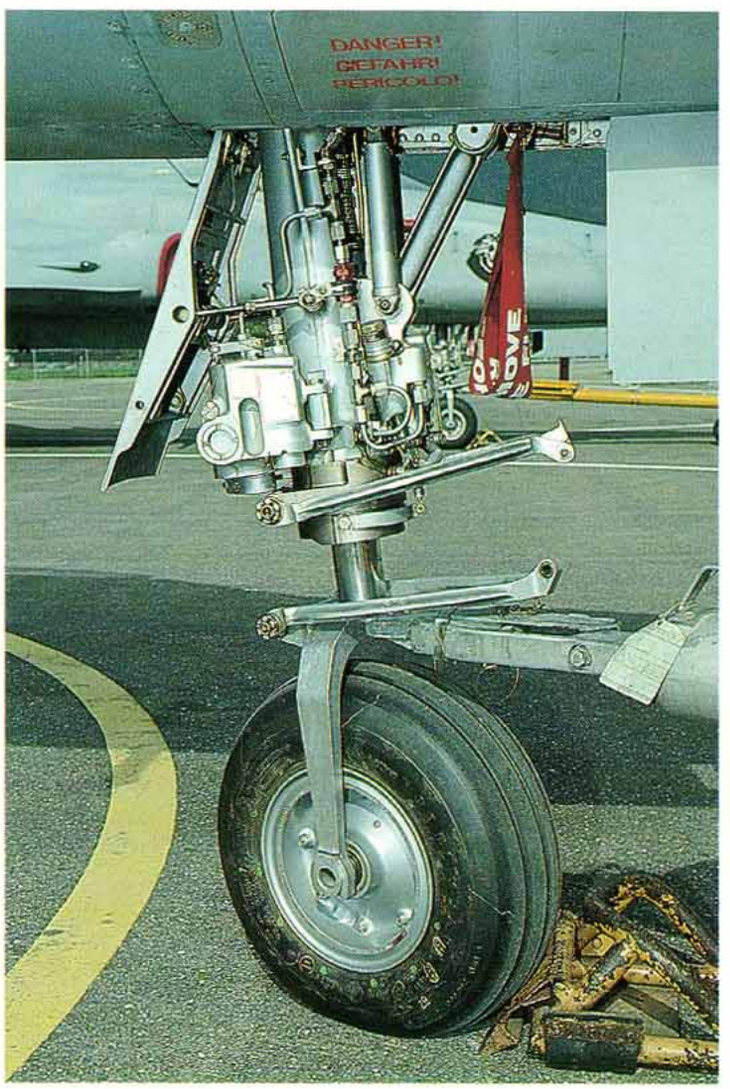


The F-5E nose gear retracts forward into its housing to be covered by a single, sideway hinged (starboard side) gear door. Inside detail of this door can be studied in the picture above. Note the static port intakes below the rescue panel, both marked with a black circle.

The port avionics bay holds, from rear to front, the UHF and VHF radio transmitters, the Air Data Computer and Radar Equipment module. Note the tube-mounted Radar Warning Antenna transmitter/responder which fits neatly into the the RWR radome in the main compartment hatch. Swiss TIGER IIs are equipped with an Emerson Electric AN/APQ-159 radar. Note the main hatch is not hinged but hangs from two straps and needs to be secured with fasteners.

The nose of the F-5E can be raised some 3 degrees for increased angle of attack on take-off. Some of the Swiss TIGERs have a manual nose gear "dehiking" system, overriding the automatic system on poor condition runways.

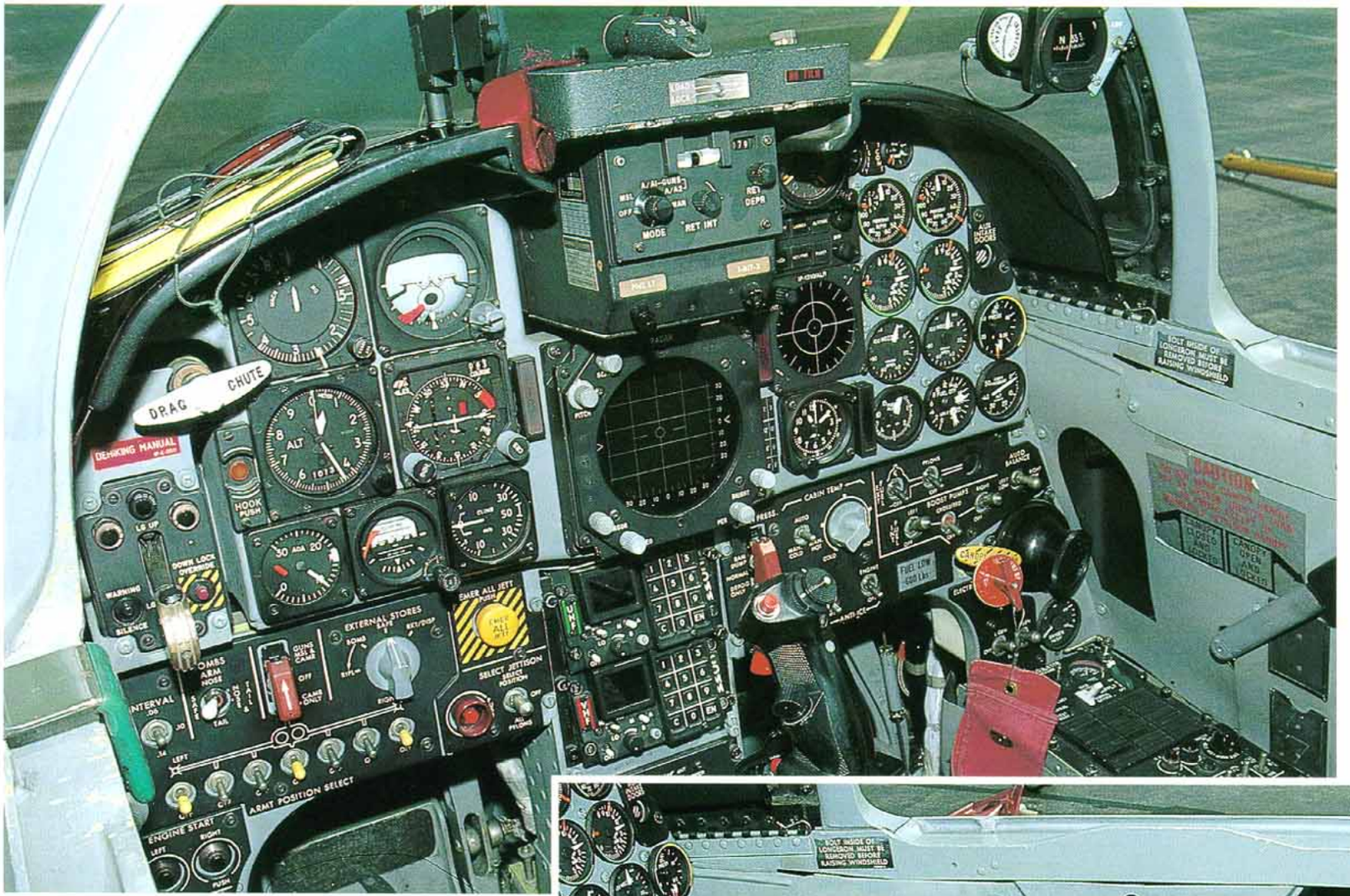


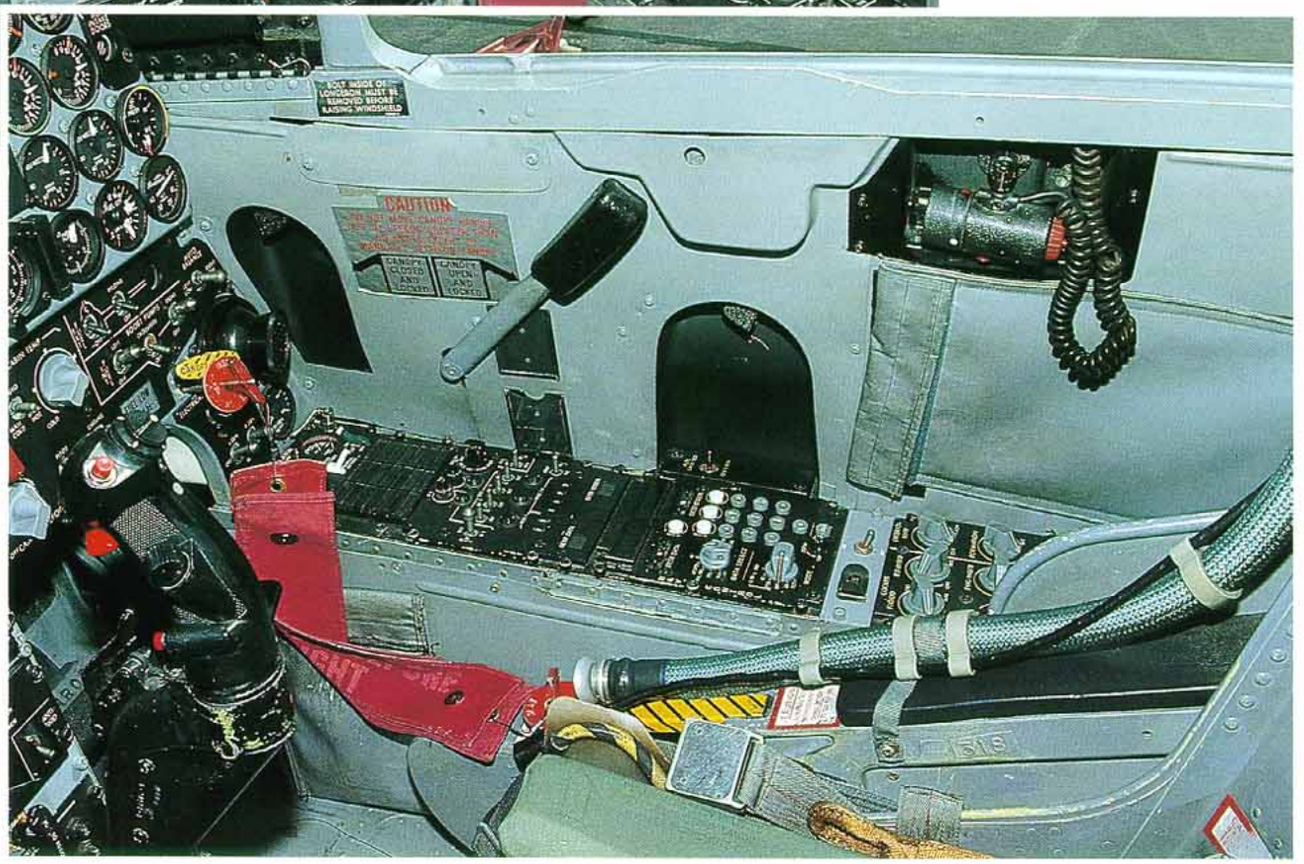


The single strut nose gear is seen here in detail with the nose wheel steering system mounted between main strut and aft wheel door section. Nose gear scissor link is disconnected here, allowing free movement of the wheel section while towing. Note the gear door retraction linkage above.

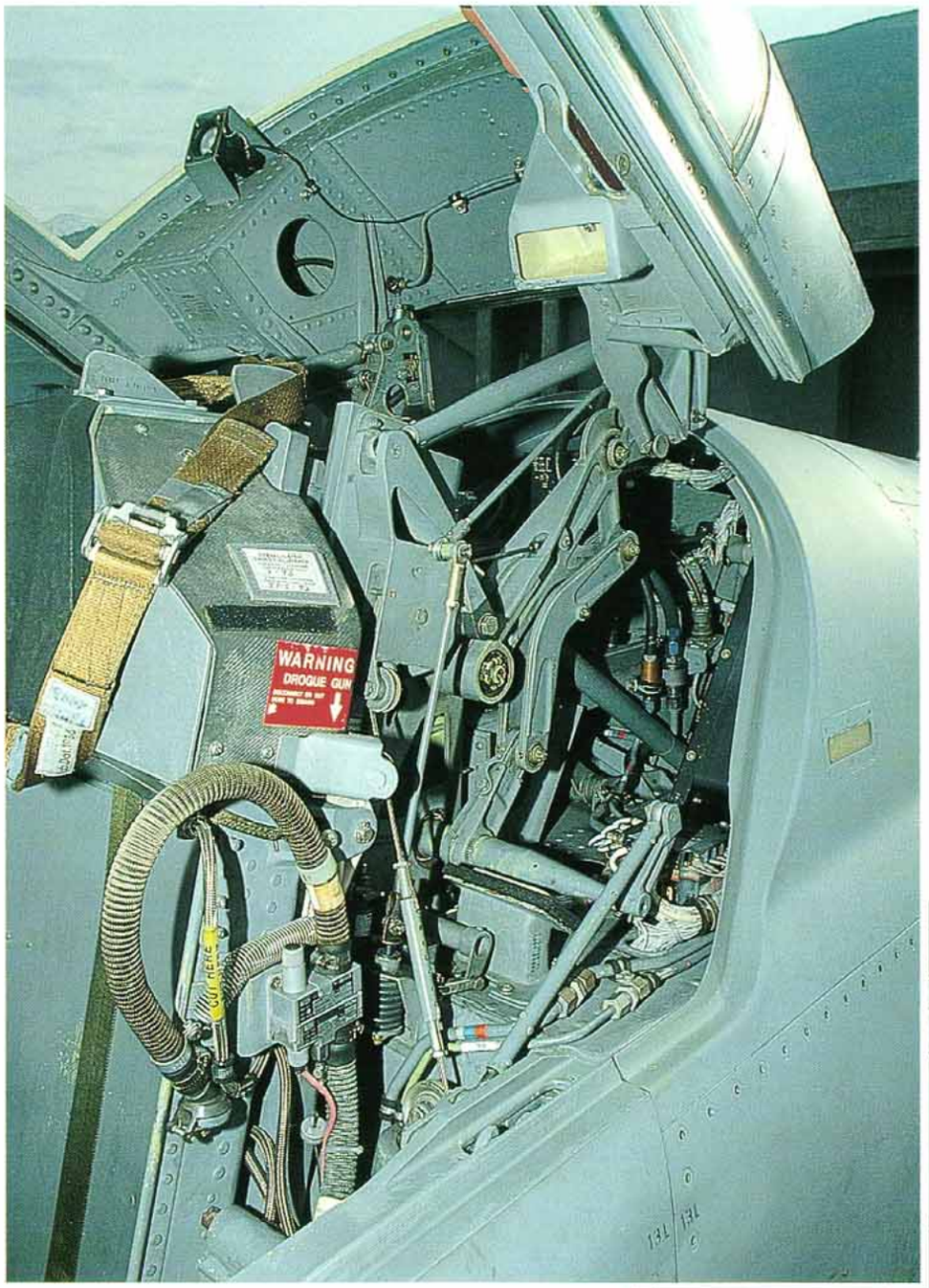
For the simple purpose of defining them as "Agressors" in aerial combat, some Swiss F-5Es are fitted with a high-visibility ventral fuel tank and bright red SIWAs as illustrated here. Aircraft J-3016 and J-3038 both belong to the first batch of 66 F-5 Es delivered from August 1978 to February 1981 (J-3001 to J-3066).

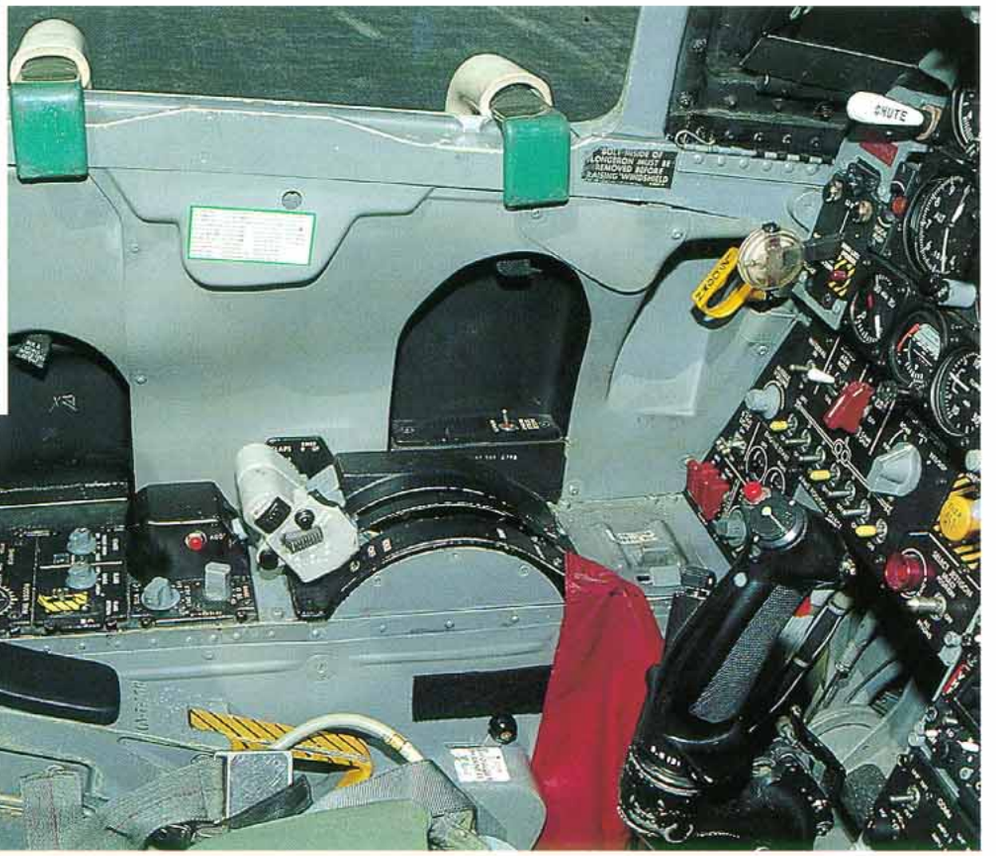
Northrop F-5E TIGERII
Swiss Air Force,
Surveillance Wing
(Photo by Christophe DONNET)





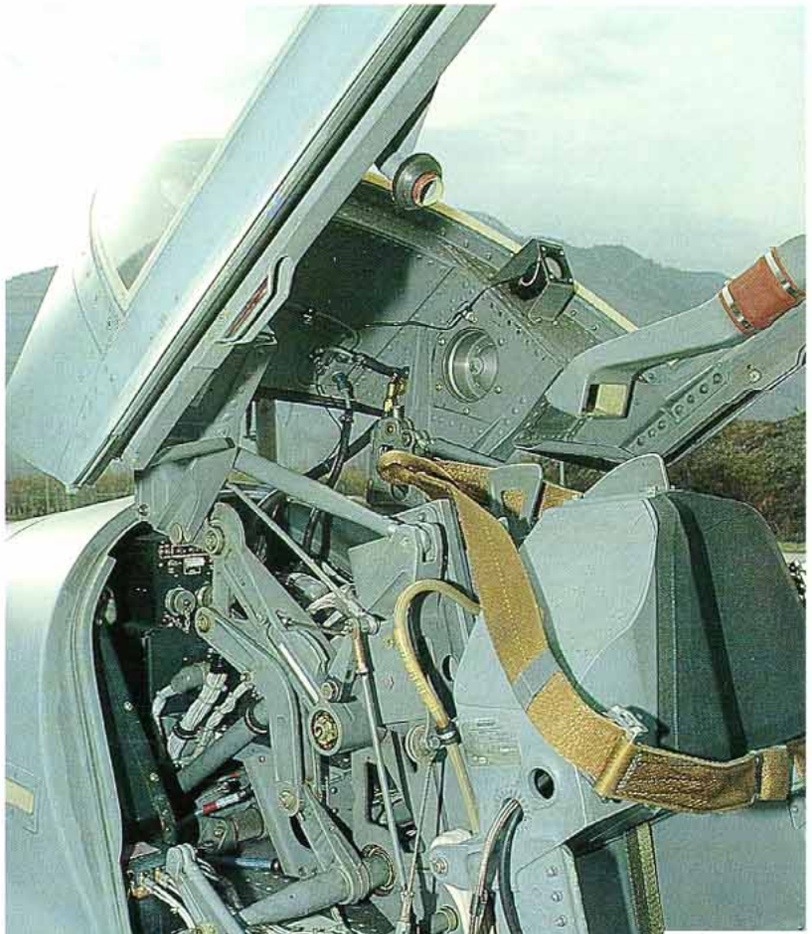
Unlike most of its 1960's contemporaries, the F-5E has a clear cockpit and side console layout. The Swiss F-5E cockpit, shown here, differs slightly from the USAF TIGER, as follows: the standby attitude indicator (usually located next to the engine instruments) has taken the place of the AOA indicator which moves to the left (replacing the arrestor hook pushbutton panel which in turn was relocated next to the altimeter). The large radar screen remains in the center but an updated VHF and UHF panels replaced the earlier UHF radio control panel. Both left and right vertical panels remain unchanged.
Side console differences are few, with the NAV control panel replacing the cockpit lighting panel which moves further aft.



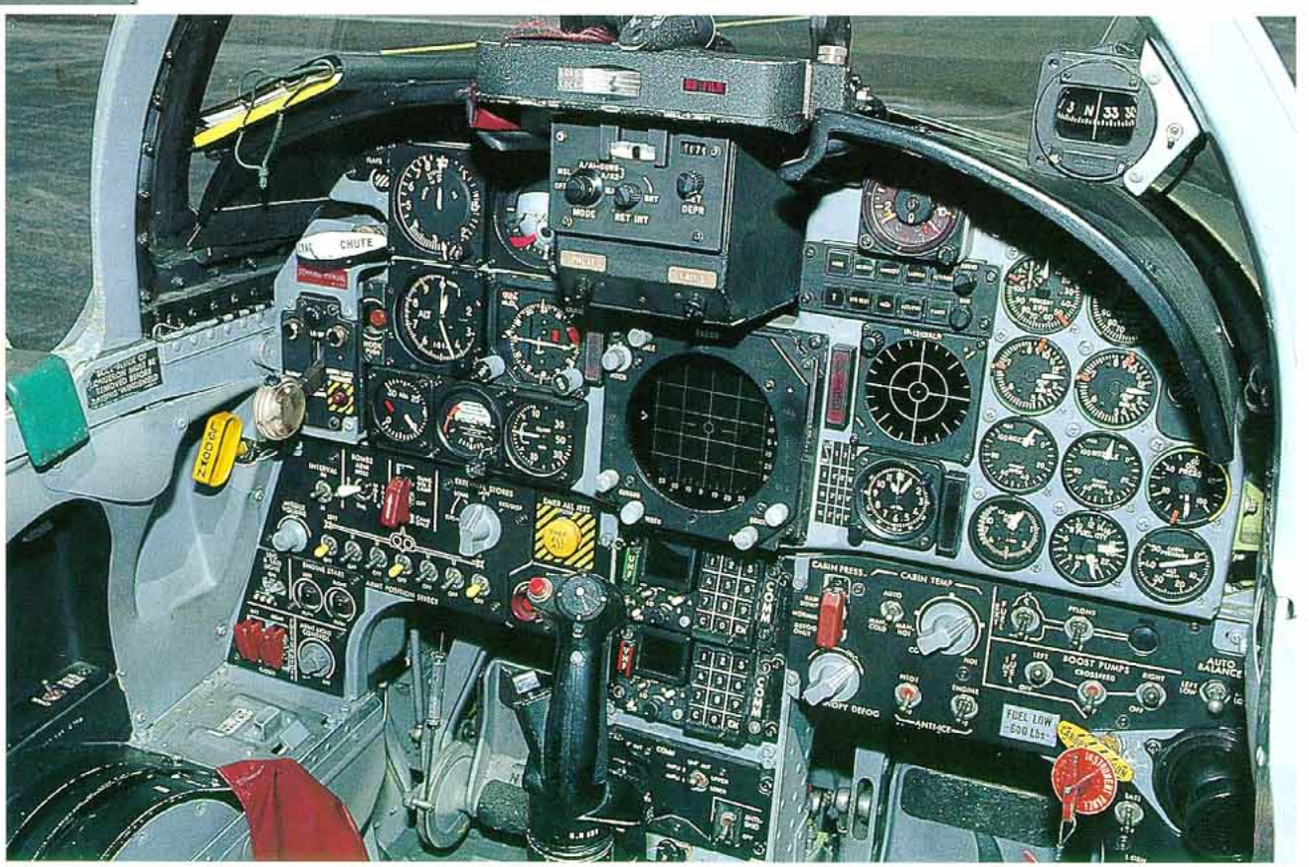


(Above) The complicated canopy actuating mechanism from the left. Note the anti-G suit hose stowed against the seat and the auxiliary lights in the rear, mounted on the canopy frame. Also note the canopy defogging adapter on the port side frame.

(Right) The installation of an external chaff/flare dispenser implicated the inclusion of a control panel which is located on the left side console, in front of the stability augmenter control panel which was relocated further aft.



The tandem-seat F-5F has two separate canopies (where more recent jets usually feature a single hood) of which the aft actuating mechanism is identical to the single-seat version. The front hood raising mechanism is of a much simpler design.



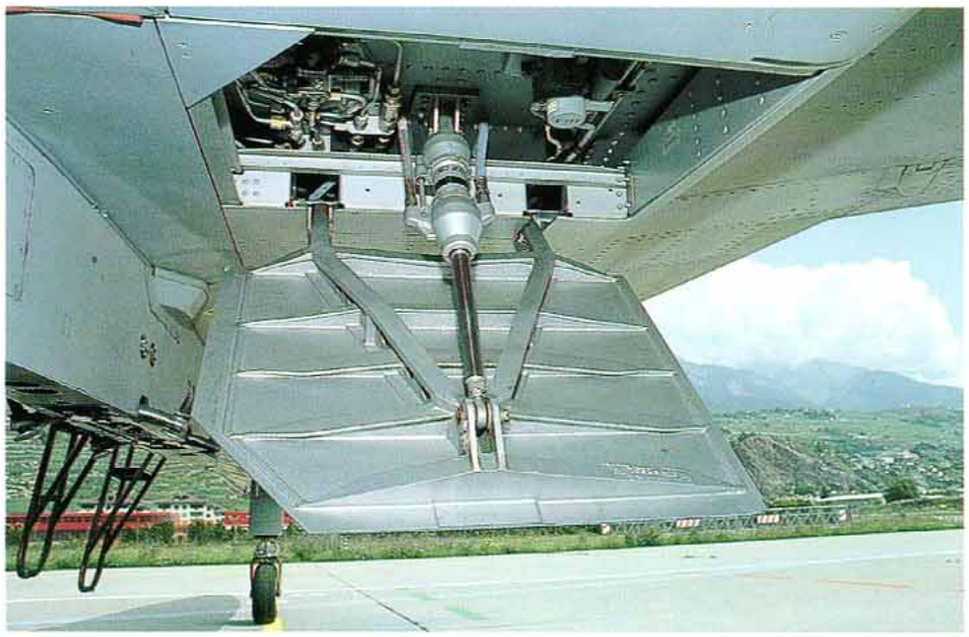
The main difference in cockpit layout can be found next to the engine instruments where a G-meter has been added over an additional pushbutton panel, the IP-1310/ALR Radar Warning System screen replacing the cabin pressure gauge. The gun sight is identical.

The F-5F, the dual-seat version of the F-5E, is primarily used as a trainer, although it has the same combat capability of its single seat stablemate. It can carry all external stores usually fitted to the F-5E but internally armament is degraded to just one M-39 cannon, installed on port side. The position of the starboard side gun barrel is taken by a cooling air scoop, strongly resembling the lethal end of an onboard cannon, so deceiving adversaries and aviation journalists.

Major external difference is of course the addition of the second cockpit, increasing overall length with some 42 inches (1067mm, totalling 15,76m overall) and the 300 lbs counterweight under the rear fuselage between the engine nacelles. This weight can also be found on US Air Force F-5Fs but not on Navy F-5Fs because they do not have radar equipment in the nose.
Like some of the first F-5Es, J-3202 has larger non-standard national markings on its tail.

As is commonly known, the Swiss Air Force not only operates from hardened surface shelters but also from mountain "caverns". Unfortunately, the increased length of the F-5F excluded it from being stowed in these safe hide-outs, also because of the onboard explosive liquid oxygen system which was considered too dangerous inside these confines.

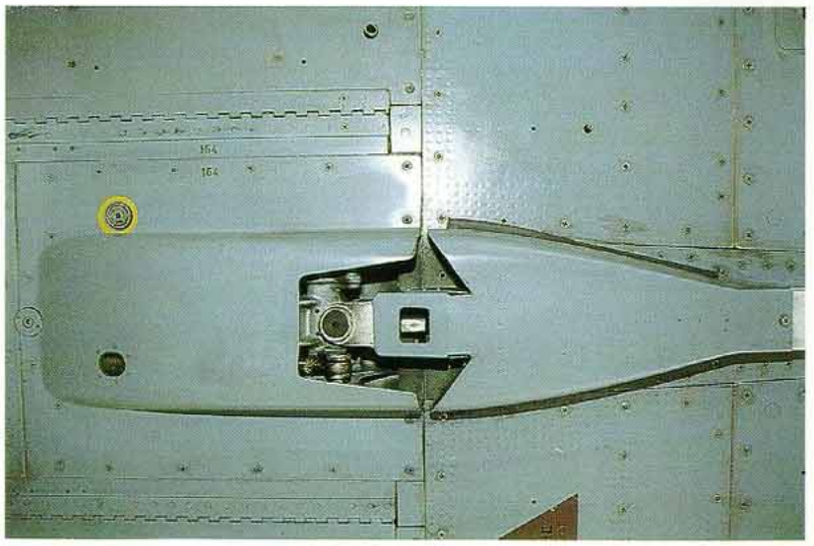
The sleek lines of the F-5F are very apparent in this quarter rear view of the nose section, clearly demonstrating its relation to the T-38 Talon, built by the same manufacturer. Note the bright red color of the cockpit center frame and the position of the low voltage formation light strip on the canopy instead of the fuselage as with the F-5E. Also note Sidewinder launch rail inner detail.



Inner detail of the magnesium construction ventral airbrake, the inboard edge cut for belly storage clearance, and its actuating rod.

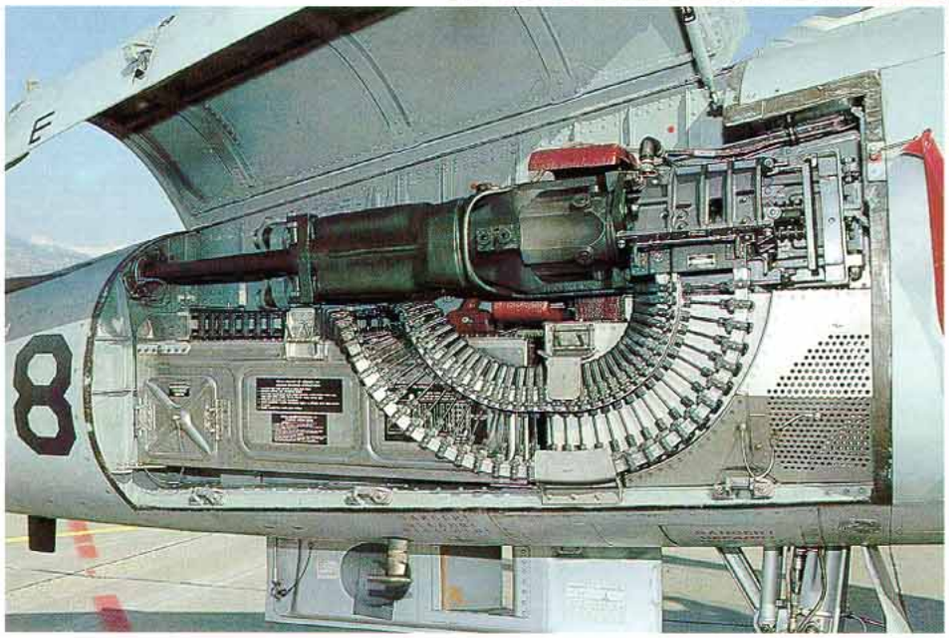
The airbrake manifold and control valve are roof-mounted inside the shallow housing.

TIGER tail detail with fin tip leading edge UHF aerial, white TACAN/IFF bands at the trailing edge, fuel vent and VHF communications antenna immediately above the rudder.
Note the all-flying horizontal tailplane and its fuselage hinge point.



Important detail is the arresting hook fuselage attachment(above) and the two small rectangular hatches on either side of the hook to reach the engine oil reservoirs and from which mechanics retrieve small bottles of unburned fuel from the combustion chambers. Port panel also has engine starter hose hook-up.

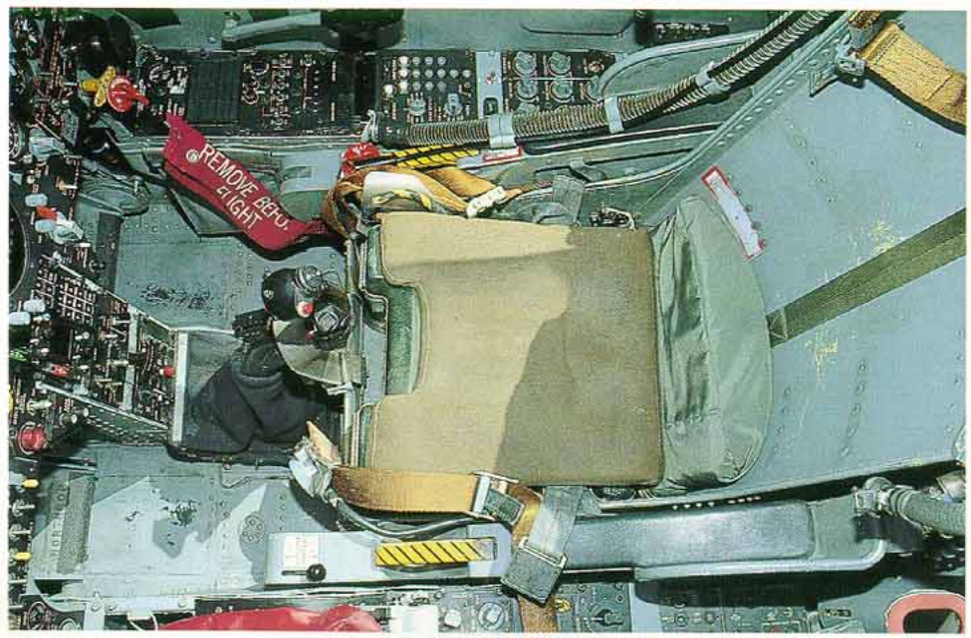
An additional batch of six F-5Fs was ordered by the Swiss Air Force (J-3207 to J-3212) to be assembled in Switzerland by a federal factory called F+W, these to include components provided by Swiss subcontractors. J-3207 bears the Eagle marking of "Escadrille d'Aviation 1", a professional "French" squadron.
Note that only F-5Fs have the boundary layer fence on the wing in front of the flaps, clearly seen in this view.



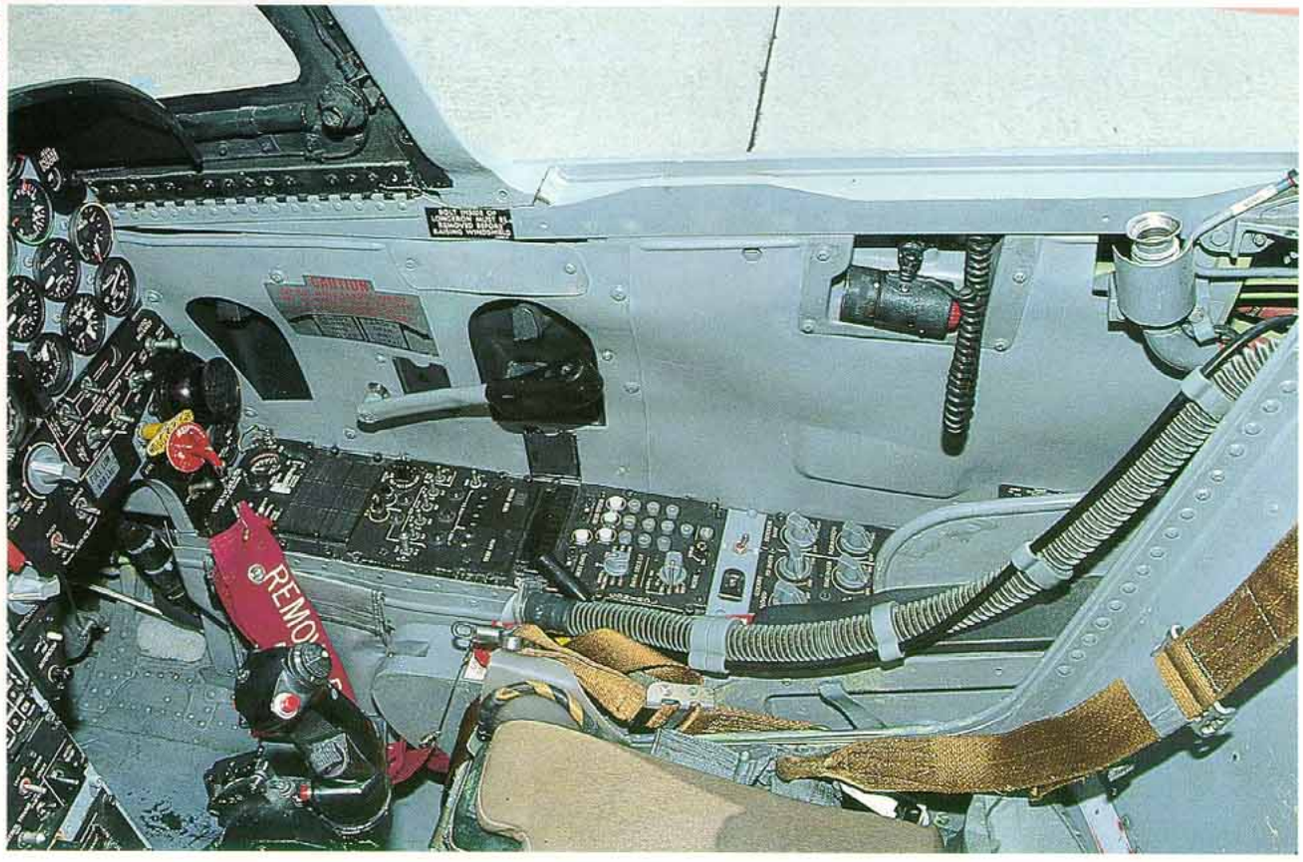
The single cannon of the F-5F has only 140 rounds because of a smaller ammo box as a result of a more forward position of the latter (meaning a narrower fuselage cross section). Empty shells are retrieved in the perforated compartment behind the gun. The hinges on the gun compartment hatch are from three gun gas escape doors.

Swiss Air Force F-5Fs are mainly used to train newcomers on this type of aircraft during the 17 week transition course at the Pilot Officer School. Additionally, the twin-seat TIGER is frequently used for evaluation or "refreshment" flights for reserve pilots.
J-3206 seen here parked on the Dübendorf apron belongs to "Fliegerstaffel 18" and has only one IR SIWA missile installed on the left missile launcher rail, as is customary with the Swiss Air Force. However, sometimes these dummy missiles move to the starboard wingtip to avoid structural damage.
Note the boarding ladders are always attached to the port side cockpit sill. Also note the unusual "duck" shape of the nose cone.

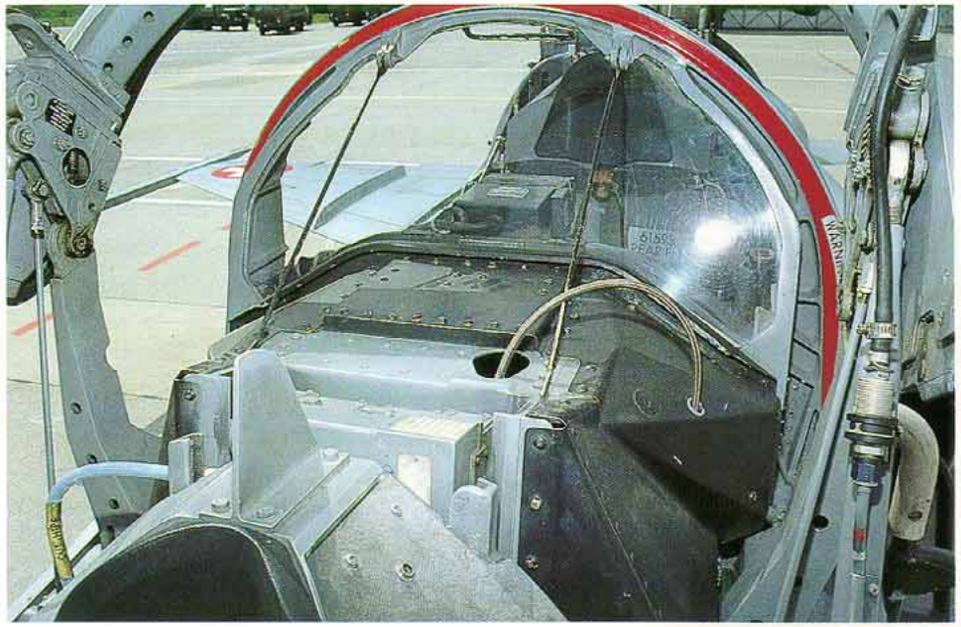
The absence of a forward windscreen frame gives the pilot excellent forward visibility. The AN/ASG-31 lead computing optical sight is the only piece of equipment installed on the otherwise spartan instrument cover. Note the logbook stowed below the windscreen, indicating J-3202 has just been taken out for an evaluation test flight.



Looking down to the cockpit floor and the ejection seat survival kit with seat cushion. Note the tight fit of the seat between the side consoles and the small cushion to the back for supporting the pilot's parachute.



Front cockpit layout of the F-5F is completely analog with the F-5E.
The AN/ASG-31 optical gun sight can be used in automatic mode with data from the radar for air defense tasks and manually for ground-attack missions. Note the standby magnetic compass mounted on the windscreen frame (on both F-5E & F-5F).
Although side consoles are similar, side wall detail differs from that found in the F-5E. Canopy locking lever is present but the map case moved to port side. Note oxygen hose on the right side of the seat.



One apparent difference between the F-5E and F-5F front cockpit is the position of the main instrument panel in relation to the front windscreen frame. Whereas the emergency landing gear handle recess is almost at windscreen frame level with the F-5E (see page 21), it is well inside the windscreen with the F-5F.
Note the open safety pin stowage box in front of the throttle quadrant.

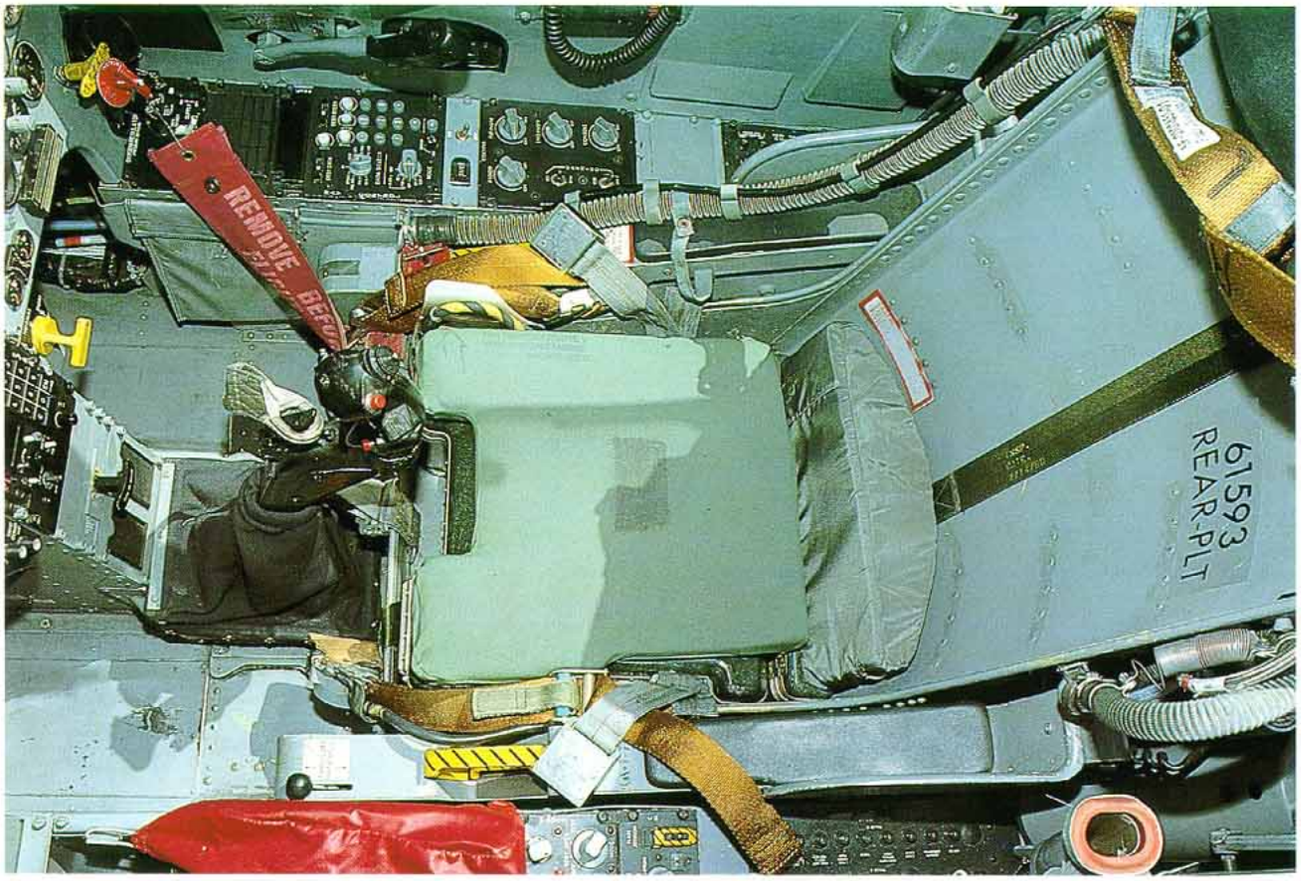
To protect the backseater in case of a birdstrike or emergency bailout, a solid perspex screen has been installed between both cockpits. Note the red paint on the center frame, the data box behind the seat and the canopy piercer on top of the seat headrest annex drogue chute container.

Port side console and side wall detail with the soft skin map case attached to the wall as mentioned on the previous page. The most forward black recess houses the nose strut switch (front) and angle-of-attack maneuver mode switch. Both above and left photo provide a clearer view on the rudder pedal assembly with NORTHROP inscriptions. Note the green boarding ladder hook-ups on the canopy sill.

Because of space restrictions in a narrower fuselage cross section, the rear cockpit main instrument panel is of a much simpler design with relocated flight instruments and fewer engine related monitoring gauges. The IP-1310/ALR switch box has been mounted in lieu of the optical gunsight which is not present here and the large AN/APQ-159 radar screen has been moved to the right.

(Top left) The forward canopy operating mechanism and rear instrument panel cover from the rear. Starboard side detail is a mirror image of this side.
Starboard side detail of the side console with minimal control panels. Note the forward position of the cockpit light on the side wall and the yellow ejection seat sequence selector handle aside the central pedestal. At the bottom of the pedestal can be seen the rudder pedal adjustment handle on top of two data placard holders.

(Following page) Some views concluding the F-5F cockpit survey with the rear canopy mechanism identical to the single-seat version.


REMOVE
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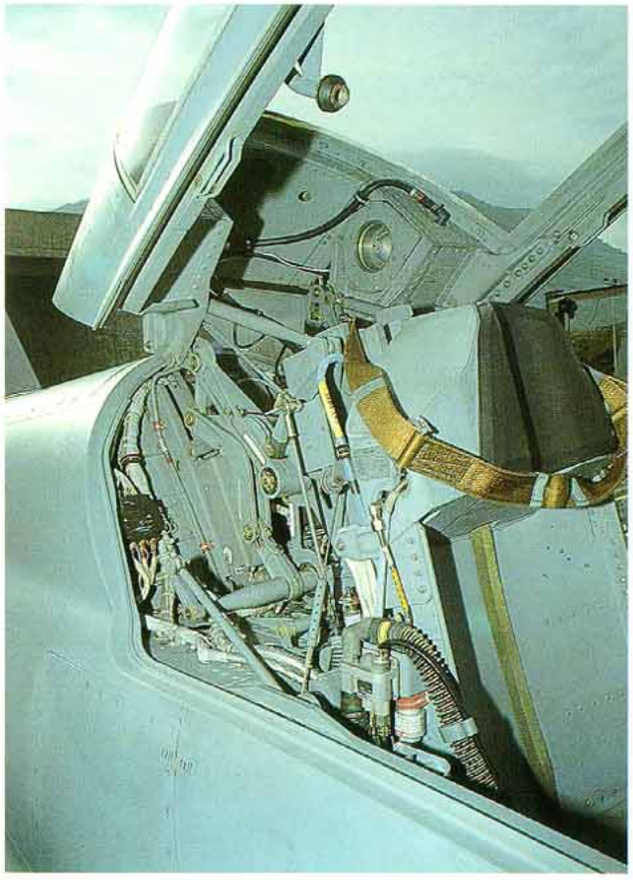
WARNING



F-5E (72-01392 LA) belonging to the 425TFTS of the 58TFTW at Williams AFB, Arizona (photo Jim ROTRAMEL).

F-5E (72-01389), COs a/c of the same unit with two "MIG kill" markings on canopy frame (photo Jim ROTRAMEL).

F-5E (71-1417), also of the 425TFTS, 58TFTW at Williams AFB, Arizona (photo LEADER via Jim ROTRAMEL).

F-5E (72-01393), 425TFTS, 58TFTW used for target towing duties. Note different tail markings between aircraft (photoJ. ROTRAMEL).

F-5E (72-01405), 425TFTS, 58TFTW with Vietnam style camouflage of green and dark green over tan with light grey belly color (photo Jim ROTRAMEL).
F-5E (73-00897) of the 57 FWW at Nellis AFB, Nevada in Agressor scheme with red and yellow nose code (photo Jim ROTRAMEL).

Prestine CO's aircraft (F-5E 74-01557) of the 57th TFTW, Nellis AFB, Nevada in agressor's "Blue" scheme (photo Jim ROTRAMEL).

F-5E (74-01528) of the 65th FWS, 57th FWW, Nellis AFB, in "Lizard" scheme passing the camera (photo Jim ROTRAMEL).

Brown and tan F-5E (73-0872) of the Marines at the NFWS "Top Gun" at Miramar Naval Air Station, Ca (photo Jim ROTRAMEL).

Navy operated F-5E 159879/541 at the same location as far back as December 1975 (photo Jim ROTRAMEL).

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