

**PROFILE
PUBLICATIONS**

The
North
American
F-100
Super
Sabre

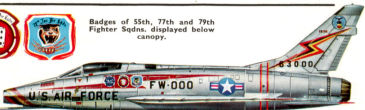
**NUMBER 30
TWO SHILLINGS**





Badges of 55th, 77th and 79th
Fighter Sqdns. displayed below
canopy.

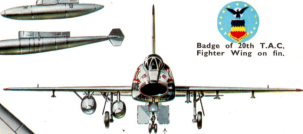
COL
R. F. TOLIVER
JAN 1955
1ST LT
R. H. HEMMETT



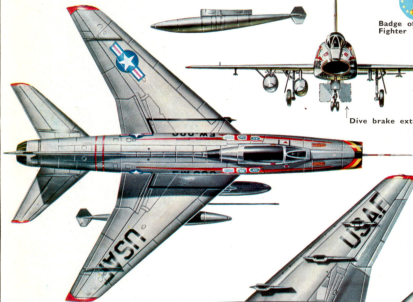
Displayed on nose immediately
forward of windscreen.



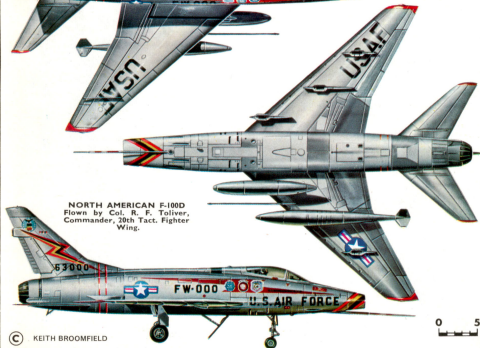
Badge of 10th T.A.C.
Fighter Wing on fin.



Dive brake extended.



NORTH AMERICAN F-100D
Flown by Col. R. F. Toliver,
Commander, 10th Tact. Fighter
Wing.





The North American F-100 Super Sabre

by Ray Wagner

F-100C-10s of the Skyblazers in formation.

(Photo: U.S.A.F.)

As the first supersonic fighter in service in the Western world, the North American F-100 Super Sabre introduced the "Century Series" fighters with their greater complexity of construction, new dimensions of performance, and the sonic booms now common around military air bases.

The evolution of this design began in February 1949 with efforts to improve the F-86 Sabre by achieving supersonic speeds. By 14th September 1949, an advanced version of the F-86D interceptor was designed with 45 degree sweep on the wing and tail surfaces.

Demands for improved fighters increased after the appearance of the MiG-15 in the Korean war, and favourable Air Force reception of the "Sabre 45" prompted North American to initiate engineering work on their NA-180 design at Los Angeles on 19th January 1951.

An initial contract was awarded by the Air Force on 1st November 1951 for two YF-100A prototypes and a production version begun as the NA-192 (F-100A) on 20th November. Newly discovered aerodynamic refinements to improve speed were incorporated on the mockup, approved by the Air Force on 26th August 1952. Among these changes were the increase of the fuselage's fineness ratio, an extended clamshell canopy, and lowering the horizontal tail (as tested on a YF-86D).

The first YF-100A (52-5754) was completed on schedule, 24th April 1953, and was secretly moved from the Los Angeles factory to Edwards Air Force Base, California. There George Welch, the company's chief test pilot who had first flown the F-86, made the first flight of the YF-100A on 25th May. The speed of sound was exceeded on the first flight, and on a second one made that same day.

The source of the Super Sabre's speed was, in the first place, the powerplant, a Pratt & Whitney J57-P-7

two-stage turbojet rated at 9,700 lb. military thrust, and 14,800 lb. with afterburner. All the fuel was contained in the long fuselage, and air was fed in through the nose ram inlet.

The thin wing had 45-degree sweep, automatic leading edge slats, mid-span lateral control surfaces, and a span of 36 ft. 7 in. in its original form. Longitudinal control was achieved by movement of the entire one-piece horizontal tail, combining the functions of elevator and stabiliser in one surface set low enough to be almost directly behind the wing. The vertical fin was also swept back, with a thin rudder. The control system was hydraulically-powered and irreversible.

Other features of the F-100 included a hydraulically-operated speed brake underneath the fuselage, and a drag-chute to shorten ground roll. The cockpit had a one-piece clamshell canopy, ejection seat, and automatic air conditioning and pressurisation system. The main wheels retracted inwards into the fuselage, and twin nose wheels folded backwards.

Heat-resisting titanium was utilised from the initial design stage, for the first time in an aeroplane. North

The first Super Sabre prototype, the YF-100A, in flight.

(Photo: Peter M. Bowers)





The second F-100A-5 with original fin and rudder.

tion, and were far ahead of its contemporaries, but the Super Sabre was a highly sophisticated aircraft that would take a lot of experience to become fully

the first Air Force operational unit to receive the F-100A was the Tactical Air Command 479th Fighter Day Wing, which received its Super Sabres at George Air Force Base, California, in September 1954. At that time the U.S.A.F. had 12 F-84F, 13 F-86F, and three F-86H wings available for day fighting, plus 28 first-supersonic type, however, was delayed by an order issued 11th November, suddenly grounding the F-100.

It was realised that the danger came from violent ejection of the test instruments. The test instruments were fitted with a spring return for cases that did succeed in recovering some of the fuel. The F-100A came apart in the dive, causing a fuel leak. A supersonic dive with a pullout at 22,700 feet made a supersonic dive for the most rugged structural test. It had taken 52.5 seconds for the most rugged structural test pilot, Welch, On 12th October 1954, the veteran test pilot had run into a stability problem that had caused a series of accidents, one causing the death of George. The problem of supersonic flying, the subject above had run into a stability problem that had caused a series of accidents, one causing the death of George.



(Photo: Peter M. Bowers)



NOTE: I was in position 1-1004-1 (1-1004-10), below:



SPEED RECORD ATTEMPT

F-86F being produced at the same time. YF-100A was 18,135 lb., and gross weight was 28,561 lb.; compared to 10,890 and 17,921 lb. for the American used 80 per cent of all the titanium produced in the United States until 1954. Empty weight

Another 17 was made over a 15 km. course, where the one per cent margin would not apply. On 29th October 1953, piloted by Lt.-Colonel F. K. (Pete) Everest, chief of flight test operations laboratory at Edwards Air Force Base, the YF-100A set a new record of 755.149 m.p.h. over a 1000 AOA set. It was not then revealed that this speed, flown at only 100 feet from the ground, was about 100 m.p.h. under the plane's actual design speed in the thin air of

On the same day this record was set, George Welch made the first flight of a production F-100A, 52-5756. It was similar in appearance to the prototypes except for a shorter vertical tail, with a small rudder below the fuel vent tube. Armament consisted of four 20 mm. M-39 guns installed below the cockpit with 800 rounds of ammunition. This gun had been tested in Korea on modified F-86Fs as the T-160, and fired 1,500 rounds per minute at a muzzle velocity of 3,300 feet per second. A radar-ranging device was installed in the upper lip of the nose inlet.

The F-100A's mission was seen as "air superiority fighting," of the kind the F-86 had done over Korea. It would take off with two 275-gallon tanks at a gross weight of 28,899 lb., fly out to a combat radius of over 350 miles, and drop its tanks for battle. At a combat weight (60 per cent fuel) of 24,996 lb., top speed ranged from 760 m.p.h. (March 1) at sea level to 852 m.p.h. (March 1-285) at 35,000 feet. At take-off ceiling (500 ft./min. climb) reached 51,000 feet. These were the characteristics of the final service configuration (44,900 feet, while at combat weight, 100 ft./min.).



The first F-100C-1 with original short fin and rudder.

(Photo: North American Aviation)

and wild gyrations of the aircraft which the pilot was unable to control. Normally, aircraft pitch and yaw is restrained by the tail. If these forces exceed the power of the vertical tail to restrain the aircraft, it may go violently out of control.

Modifications were made in the F-100 to solve this problem, and after three months the Super Sabre could be restored to flying status. These modifications were made on planes still on the assembly line, as well as about 70 F-100As already built. The vertical tail was made higher, increasing area about 27 per cent. Another foot was added to each wing tip, increasing wing area from 376 to 385 sq. ft. These additions, along with minor changes in lateral and longitudinal control systems to improve pilot feel, made it possible to perform unco-ordinated rolls without trouble.

With the aircraft safety well in hand, the biggest problem facing U.S.A.F. units became the training of ground crews to keep the new type flying. Here the problem was that the U.S.A.F. was reaching its peak size at the time large numbers of mechanics enlisted during the Korean build-up were returning to civilian life. Operation Toolbox was a programme carried out

to provide the technical personnel needed to keep the Tactical Air Force types flying.

The various safety features of the Super Sabre stood up well in service. The pilot's ejection seat, for example, saved the life of company test pilot George F. Smith on 26th February 1955, in a low-altitude supersonic bailout. Smith was in F-100A-10 53-1659 when a hydraulic lock caused an uncontrollable dive. He ejected at Mach 1.05 (777 m.p.h.) and was severely injured, but recovered to fly again.

Recognition of the Super Sabre's success came with the presentation of the Collier Trophy, the United States' outstanding aviation award, to North American's Board Chairman, J. H. Kindelberger, by President Dwight Eisenhower on 17th December 1954.

Production of the F-100A was completed in April 1955 with 203 aircraft. Those from number 167 on had the J57-P-39, of the same power as the P-7.

THE F-100 C

Meanwhile, new models of the Super Sabre were planned. An all-weather F-100B version was designed which developed into the NA-212 project begun 20th October 1953. The design eventually emerged as the F-107 fighter-bomber with a 23,500 lb. thrust Pratt & Whitney J75, and the air intake above and behind the cockpit.

A fighter-bomber version was planned in the F-100C, designated by the Air Force 30th December 1953, with the company designation NA-214. A production contract was placed in February 1954, the first strengthened wing was tested on F-100A-1, 52-5759, in July, and the first F-100C was completed in October. Al White made the first flight on 17th January 1955 in 53-1709. It had the original F-100A tail then, but got a new fin later.

Bomb-carrying capability of the F-100A had been limited to a pair of 1,000 lb. bombs. The F-100C had six underwing stations for 750 lb. bombs or other stores up to a maximum of 5,000 lb. The largest store that could be carried was a MK-7 nuclear weapon, which was released by an MA-2 low altitude bombing system (LABS). This system permitted "toss" or loft-bombing, in which the aircraft escapes an explosion much larger than that at Hiroshima by releasing the weapon near the top of a loop, throwing it away from the flight path.

For air-to-air combat, the F-101C had the usual four 20 mm. M-39 guns, and could add 42 2.75 in. rockets in two packs. Internal fuel capacity was increased from 744 gallons in the F-100A to 1,702 gallons, and an in-flight refuelling system was added. These features increased the Super Sabre's capability



The 36th production F-100C-1 with production fin and rudder.
(Photo: Peter M. Bowers)



The second F-100D-1. Below: F-100F-10.
(Photos: Peter M. Bowers)





Above is a F-100D Super Sabre of the 405th Fighter Squadron, Bangkok, Thailand. The Cobra motif was adopted by the squadron when stationed in Thailand in 1962.

from local air superiority to long-range penetration for fighter-bomber or escort missions.

A Pratt & Whitney J57-P-21 giving 10,200 lb. military thrust and 16,000 lb. with afterburner increased the F-100C's top speed, despite nearly 2,600 lb. of added combat weight. This was demonstrated by a new world's speed record set 20th August 1955. New telescopic cameras were used to time runs made at 40,000 feet over the Mojave Desert, Palmdale, California, by Colonel Horace A. Haines, and recorded a speed of 870.627 m.p.h. in one direction and 733.644 m.p.h. in the other, for an average of 822.135 m.p.h. Even this record, however, was a modest exhibit of F-100C speed, actually listed by official records at 924 m.p.h. at 35,000 feet and 904 m.p.h. at 39,500 feet.

Other improvements in the C model included single-point refuelling and a modified vertical tail. Despite its similarity to the older model, the F-100C required more than 287,000 engineering man-hours and 6,934 engineering drawings to produce, in addition to the two million engineering man-hours expended on the F-100A.

The F-100C was delivered to the 322nd Fighter Day Group at Foster Air Base, Texas, on 14th July 1955. It soon joined other Tactical Air Command units in the U.S. and abroad, and was the colourful mount of the U.S.A.F. Skyblazers aerobatic team. A total of 451 F-100Cs were built in Los Angeles by April 1956.

North American's Columbus, Ohio, plant was designated as a second source for Super Sabre production on 11th October 1954. The company project number for the first Columbus F-100C was NA-222, while the Air Force designation was F-100C-10-NH, the NH suffix distinguishing this factory's products from the F-100C-5-NA, and other ships of the Los Angeles (NA) home plant. The first of 25 F-100C-10-NHs, 55-2709, was flown 8th September 1955.

THE 'D' VARIANT

An improved version of the Super Sabre was designated F-100D by the Air Force on 27th September 1954, and NA-223 by the company, and manufacturing began in July 1955, with the first aircraft, 54-2121, finished in November.

First flown by test pilot Dan Darnell on 24th January 1956, the F-100D had a higher tail fin and a wider wing root chord increasing wing area to 400.18



F-100C two seat trainer of the 405th Fighter Squadron featured the 'Speedbird' motif on the fin, but lacked the Thai Cobra.



Above: FW-263, starboard side, with Cobra facing forward.

Below: FW-280 displays flight refuelling probe. Note various markings on nosewheel doors. (Photos: via Richard Ward)





'Triple Zilch', an F-100D-65-NA of the 55th Tactical Fighter Squadron, 20th Tactical Fighter Wing, with the blue lightning fuselage streak applied when it was allocated to the 55th. (Photo: Official U.S.A.F., via G. Letzer)



Left: 'Triple Zilch' with lightning streak removed and new air intake colour scheme. Right: F-100D-25-NA in the colour scheme it bore when representing the U.S.A.F., Europe, (20th T.F.W.) at an Annual Gunnery Meet. (Photos: Official U.S.A.F., via G. Letzer)



sq. ft. A Minneapolis-Honeywell MB-3 automatic pilot, the first developed expressly for a supersonic jet, was intended to allow the pilot to concentrate on navigation or tactics while the F-100D flew itself to the target.

Improved electronic LABS equipment was fitted to deliver a MK-7, MK-38, or MK-43 nuclear store. For plane-to-plane "buddy tanker" refuelling, a pair of 450-gallon air-refuelling tanks could be carried. Conventional war loads might include six 750-lb. or four 1,000-lb. bombs, or two GAM-83A Bulldog air-to-surface missiles. For air-to-air combat, four GAR-8 Sidewinder heat-seeking missiles could be handled by the F-100D-60-NA (NA-235), and provision for launching these were added to some earlier aircraft.

North American made 940 F-100Ds in Los

Angeles and 334 in Columbus, the latter beginning with the F-100D-35-NH (NA-224), 55-2734, first flown 12th June 1956.

TWO-SEAT F-100s

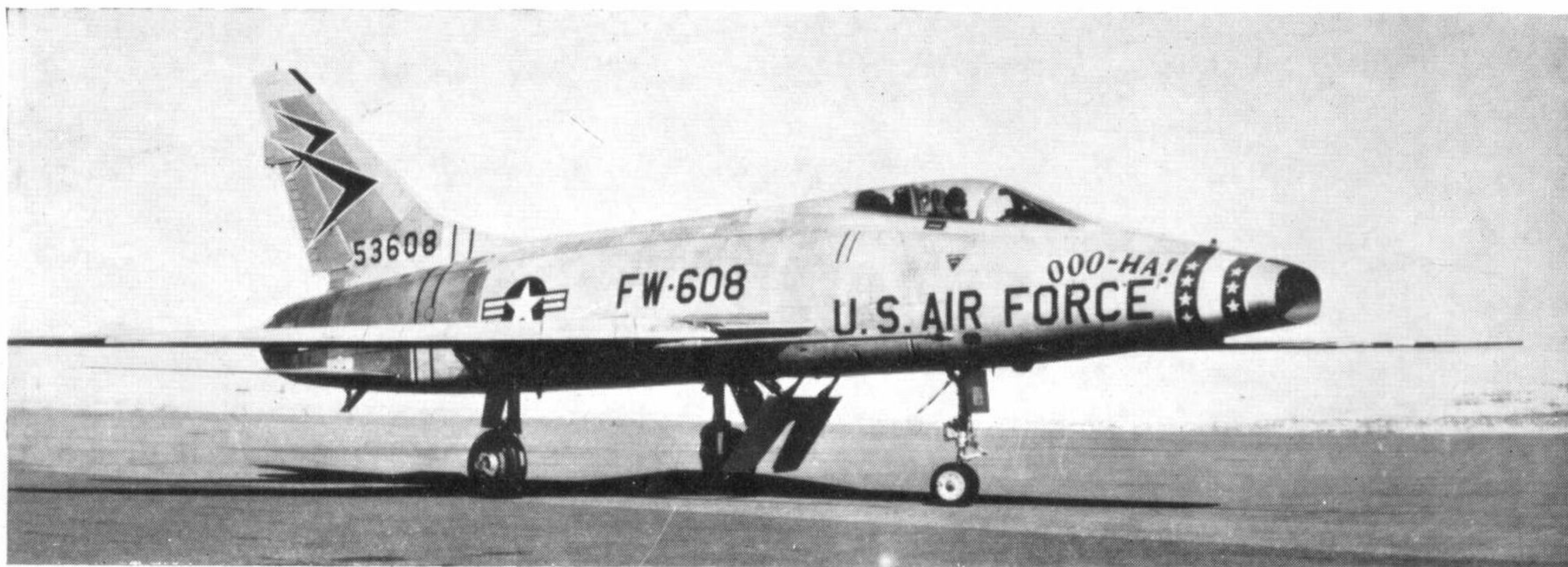
The last version of the Super Sabre built was a two-seater, intended for use as a combat proficiency trainer without loss of tactical capability. The front cockpit contained all controls for the armament, which is reduced to two 20 mm. guns, although external loads remained the same.

The first such two-seater was the TF-100C (NA-230), converted from F-100C-20, 54-1966. The first production F-100F-1 (no F-100E was made) was first flown by Alvin S. White on 3rd August 1956. Production of the F-100F continued until October 1959,

The final colour scheme of 'Triple Zilch', with fuselage flash and nose scheme removed.

(Photo: Official U.S.A.F., via G. Letzer)



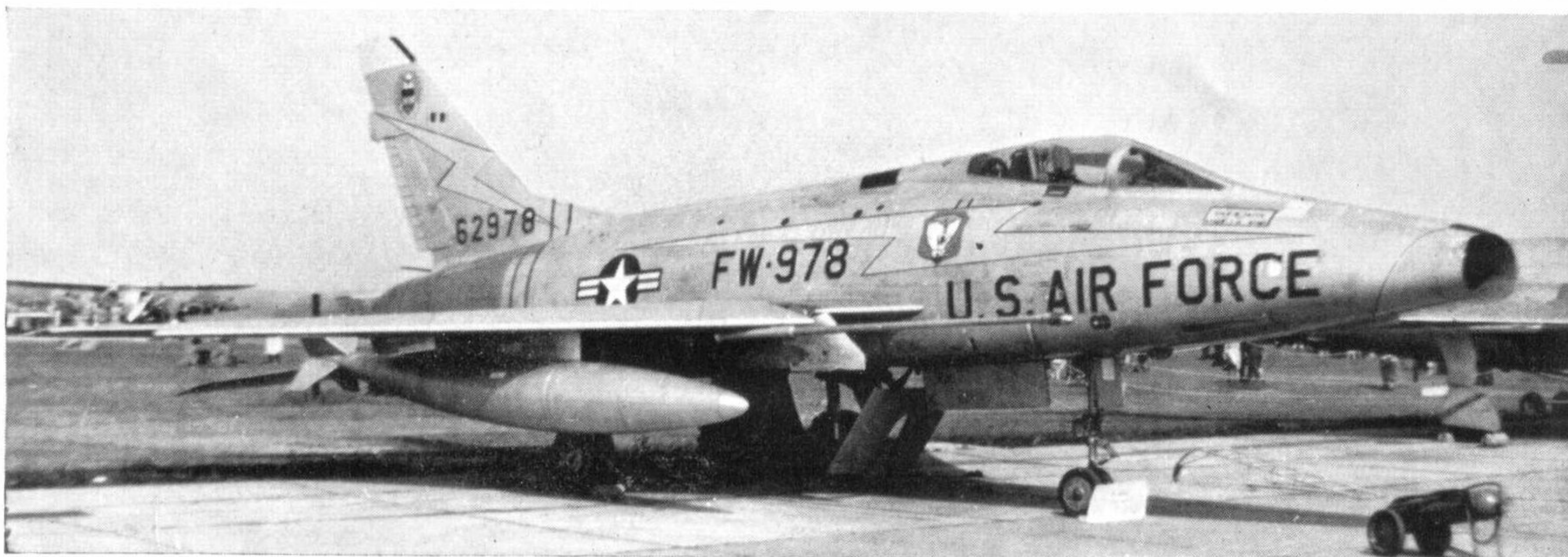


Above: F-100D-25- '000-HA'- of the 416th T.F.S.

(Photo: Mr. Menard)

Below: F-100D of the 79th T.F.S., 20th T.F.W., Alconbury AFB, Hunts, U.K.

(Photo: via G. Letzer)



with 339 built, all in Los Angeles. Super Sabre production finally totalled 2,294, including 359 at Columbus.

The manufacture of the F-100 Super Sabre required new manufacturing techniques and processes, as well as the refinement of old methods.

A greater percentage of parts are machine milled for the F-100 than for any other aeroplane in North American's history. In addition, these parts are more complex. F-100 tooling has to be heavy and strong to hold parts milled from heavy gauge material.

The integrally stiffened wings are produced by sculpturing longerons and ribs out of aluminium plate up to one and three-quarters inch thick and then milling the plate to tapered thickness. These operations are performed on large horizontal milling machines which operate in tandem.

The trend towards large integrally stiffened parts

F-100D, Wright-Patterson AFB.

(Photo: G. Letzer)



offers some offsetting advantages in reduced assembly time. For example, the F-86 wing structural box was made up of 462 pieces and put together with 16,084 fasteners. In contrast, the F-100A wing box requires 36 pieces and 264 fasteners.

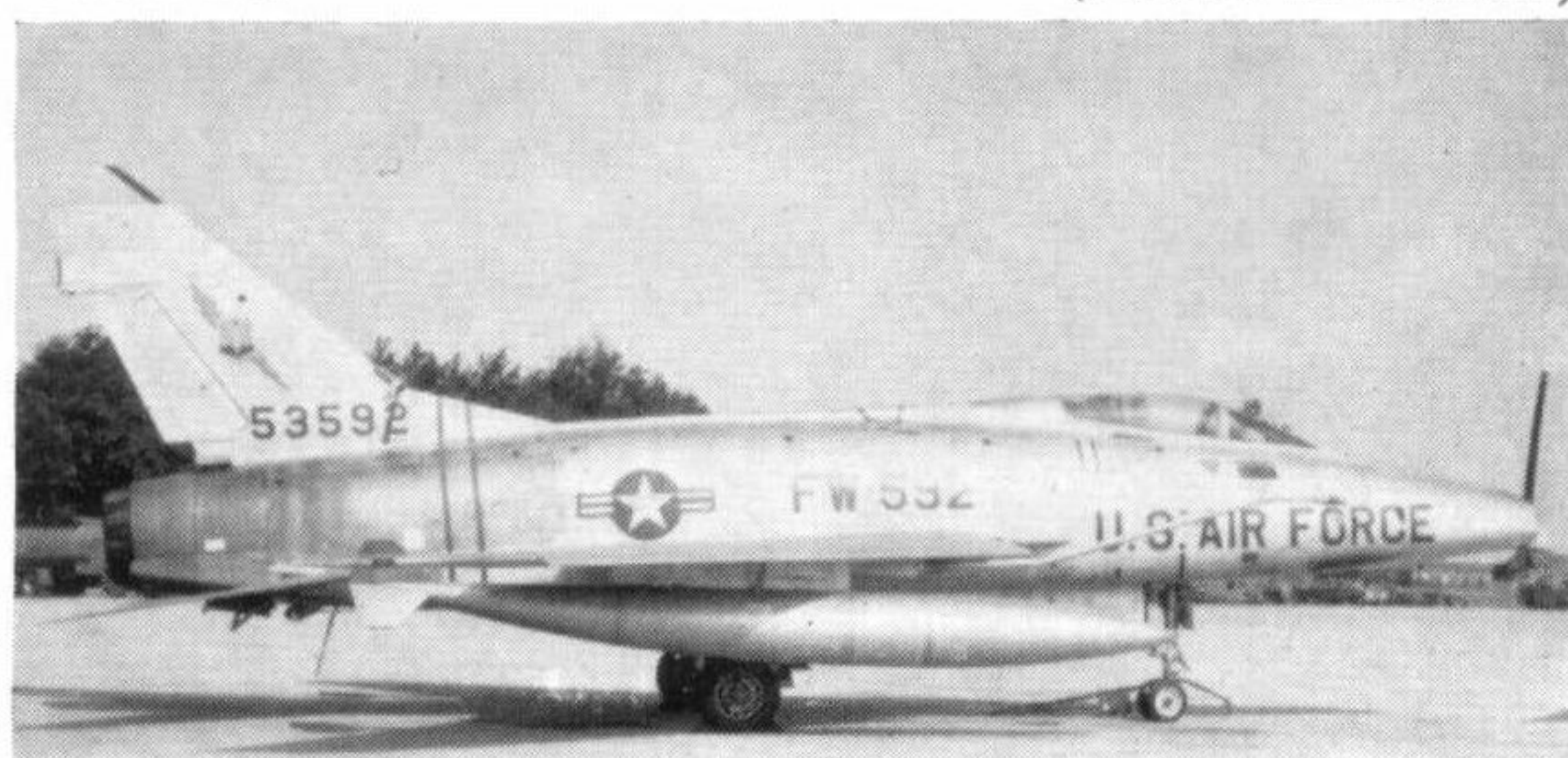
The use of Keller type drilling is approximately 180 per cent greater for the F-100A than for the F-86 types.

The tolerances required on the F-100 are so small that normal temperature changes in the plant in the course of a day cause tool and material dimensions to change to such an extent that tolerances could not be held without special handling.

Only one F-100 wing, the 479th, was operational in June 1955, but six wings were ready the following year, and 16 by June 1957. After the U.S.A.F. passed the peak of its expansion, the F-100A and F-100C were passed down to Air National Guard units and some were sent to allied powers.

In 1964, ten F-100D wings were in operation, along F-100D-20.

(Photo: R. Beseker)





An F-100D-15 with speed brake open.

(Photo: North American Aviation)



The first F-100F-1 undergoing flight tests.

(Photo: North American Aviation)



Test TF-100C which was modified from an F-100C-20. Below: F-100D-20s on a 'Buddy' flight refuelling sortie

(Photos: North American Aviation)



with eleven F-100A and F-100C squadrons in the Air National Guard.

Tactical Air Force wings with the F-100D, their associated squadrons, and headquarters were:

In the U.S.:

3 TFW (90, 416, 510, and 531) England AFB, La.

27 TFW (478, 522, 523, and 524) Cannon AFB, N.M.

31 TFW (306, 307, 308, and 309) Homestead AFB, Fla.

354 TFW (352, 353, 355, and 356) Myrtle Beach AFB, S.C.

401 TFW (612, 613, 614, and 615) England AFB, La.

474 TFW (428, 429, 430, and 481) Cannon AFB, N.M.

Overseas:

20 TFW (55, 77, and 79) Wethersfield, U.K.

48 TFW (492, 493, and 494) Lakenheath, U.K.

50 TFW (10, 81, and 417) Hahn, Germany.

405 TFW (511 [509 has F-102]) Clark AFB, Philippines.

Air National Guard squadrons:

152 FIS Tucson, Ariz.

188 TFS Albuquerque, N.M.

110 TFS St. Louis, Mo.

118 FIS Hartford, Conn.

119 TFS Atlantic City, N.J.

120 TFS Denver, Colo.

121 TFS District of Columbia.

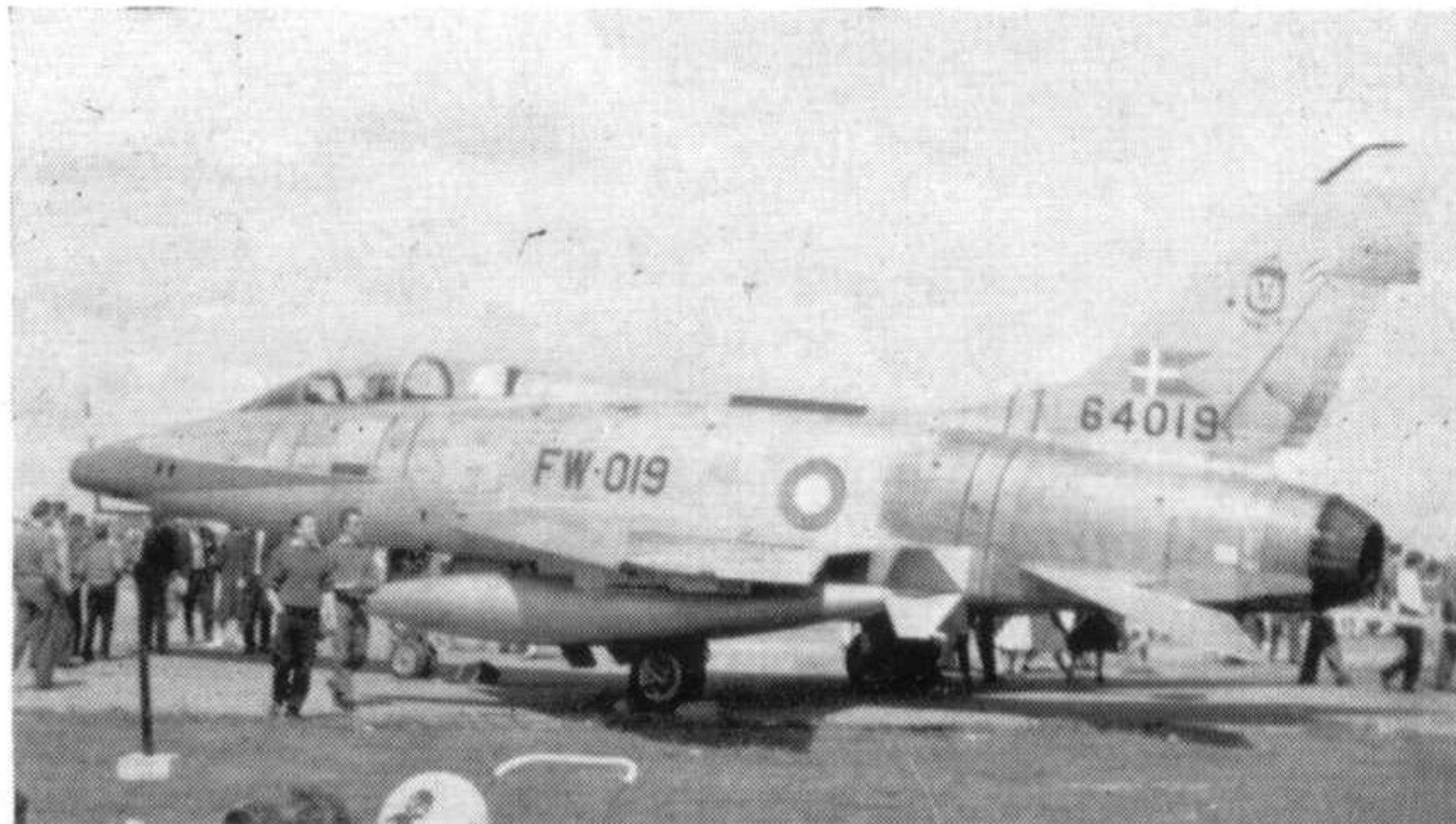
127 TFS Wichita, Kansas.

136 TFS Niagara Falls, N.Y.

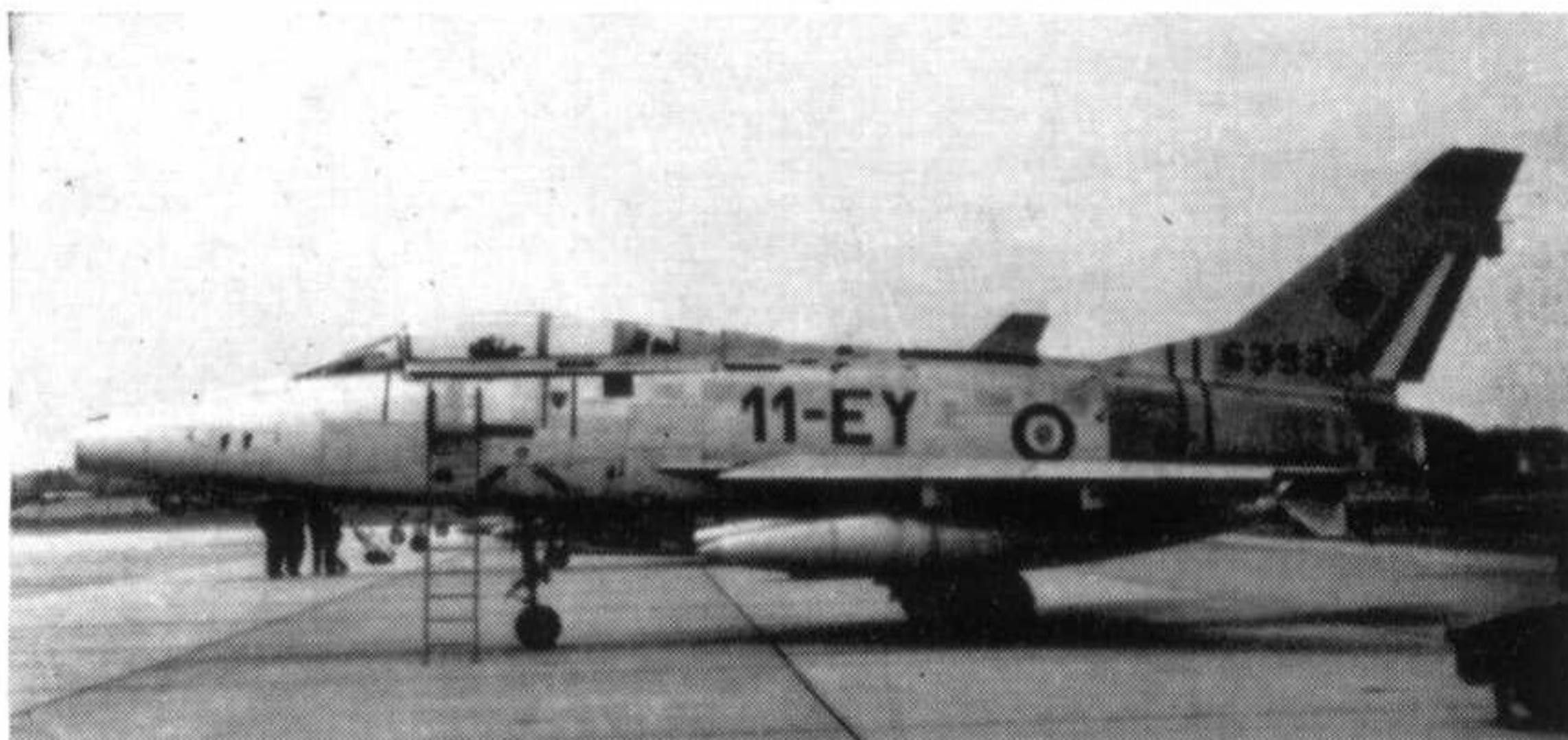
166 TFS Lockbourne, Ohio.

174 TFS Sioux City, Iowa.

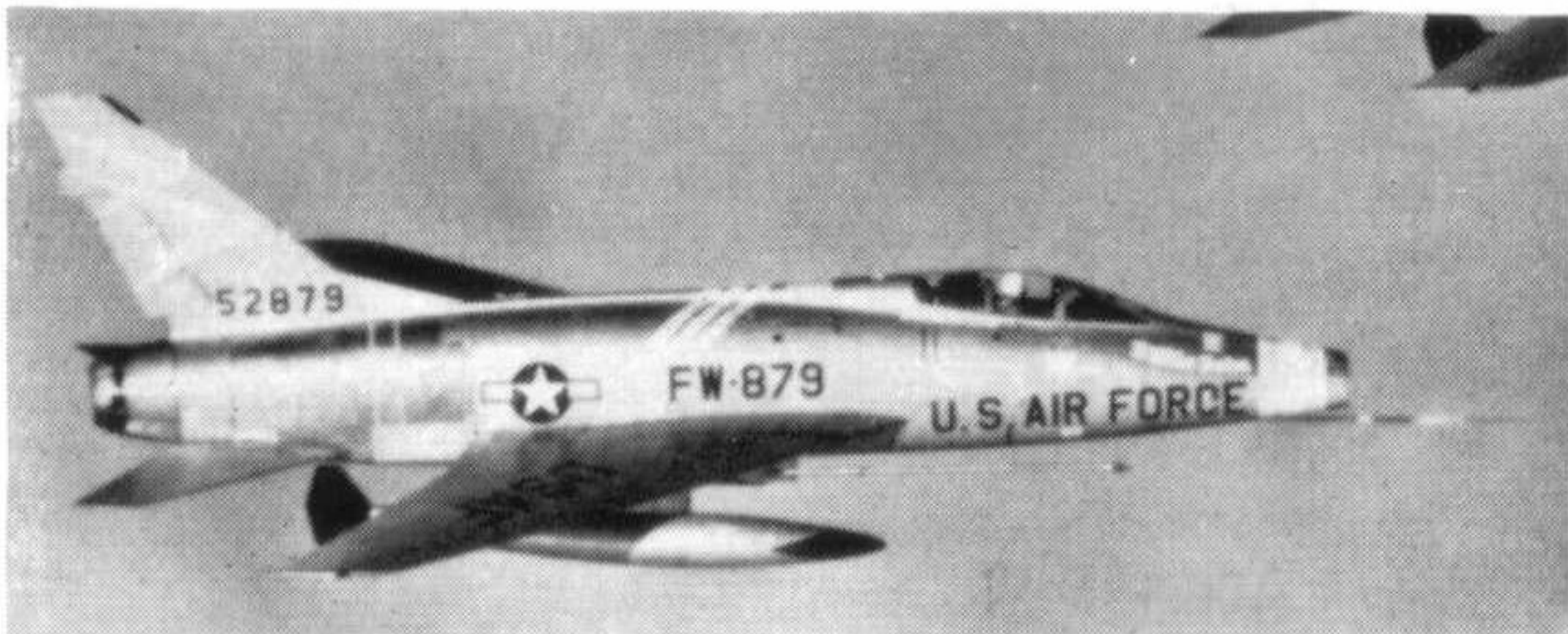
The first Super Sabres to go to foreign air forces were 80 F-100As modernised to D standards, sent to



One of the last F-100F-15s in service with the Danish Air Force. (Photo: R. Beseker)



F-100F-15 of the French Air Force. (Photo: R. Beseker)



F-100D-55. (Photo: U.S.A.F. official)



Left: Line-up of the Skyblazers F-100C-10s. Right: The Thunderbirds' F-100C-25s. Below: F-100C two-seater of the Skyblazers (Photos: G. Beseker and R. W. Harrison)





Thai. Cobra adopted by 405th.



405th Fighter Squadron.

F-100D Super Sabre, 405th Fighter Squadron, Bangkok, Thailand, 1962.



Marking detail of FW-235.



Thunderbird insignia.



Outstanding Unit Award Ribbon.



118 F. Sqdn.
(the background colour varied).

F-100C, Thunderbirds Aerobatic Team. ▲

F-100C, 118 F. Sqdn.
Connecticut Air
National Guard.



55th T.F.S.



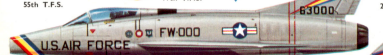
77th T.F.S.



79th Tactical
Fighter Sqdn.



20th Tactical Fighter Wing.



F-100D-65-NA, "Triple Zilch", 20th Tactical Fighter Wing, R.A.F. Wethersfield, U.K., 1960.



F-100D-65-NA, 55th Tactical Fighter Squadron, 20th T.F.W., R.A.F. Wethersfield, U.K., 1957.

F-100D-65-NA, 79th Tactical Fighter Squadron,
20th T.F.W., R.A.F. Wethersfield,
U.K., 1957.



F-100C at Wright-Patterson Air Force Base. Note the various modifications—under nose strake, afterburner and store on wing pylon.

(Photo: R. Beseker)



Nationalist China in 1960. Turkey received 260 F.100Cs for four fighter-bomber wings. The Royal Danish Air Force used the F-100D for its 725, 727, and 730 squadrons, while France's Armee de l'Air had

Super Sabres for the 3rd and 11th Escadres de Chasse. All of these nations also used F-100Fs for pilot proficiency practice.

© Ray Wagner, 1965

F-100 Serial Numbers						
U.S.A.F. Type	N.A.A.	U.S.A.F. Serials	No. A/c			
YF-100A-NA	NA-180	52-5754 thru 5755	2	F-100D-30-NA		55-3702 thru 3814
F-100A-1-NA	-192	52-5756 thru 5765	107	F-100D-35-NH	-224	55-2734 thru 2743
F-100A-5-NA	"	52-5766 thru 5778	13	F-100D-40-NH	"	55-2744 thru 2783
F-100A-10-NA	"	53-1529 thru 1568	40	F-100D-45-NH	"	55-2784 thru 2863
F-100A-15-NA	"	53-1569 thru 1608	40	F-100D-50-NH	"	55-2864 thru 2908
F-100A-20-NA	"	53-1609 thru 1708	100	F-100D-55-NH	"	55-2909 thru 2954
F-100C-1-NA	-214	53-1709 thru 1778	70	F-100D-60-NA	-235	56-2903 thru 2962
F-100C-1-NA	-217	54-1740 thru 1769	30	F-100D-65-NA	"	56-2963 thru 3022
F-100C-5-NA	"	54-1770 thru 1814	45	F-100D-70-NA	"	56-3023 thru 3142
F-100C-15-NA	"	54-1815 thru 1859	45	F-100D-75-NA	"	56-3143 thru 3198
F-100C-20-NA	"	54-1860 thru 1970	111	F-100D-80-NH	-245	56-3351 thru 3378
F-100C-25-NA	"	54-1971 thru 2120	150	F-100D-85-NH	"	56-3379 thru 3463
F-100C-10-NH	-222	55-2709 thru 2733	25	F-100D-90-NA	-235	56-3199 thru 3346
F-100D-1-NA	-223	54-2121 thru 2132	12	F-100F-1-NA	-243	56-3725 thru 3739
F-100D-5-NA	"	54-2133 thru 2151	19	F-100F-5-NA	"	56-3740 thru 3769
F-100D-10-NA	"	54-2152 thru 2221	70	F-100F-10-NA	"	56-3770 thru 3919
F-100D-15-NA	"	54-2222 thru 2303	82	F-100F-15-NA	"	56-3920 thru 4019
F-100D-20-NA	"	55-3502 thru 3601	100	F-100F-15-NA	-261	58-6975 thru 6983
F-100D-25-NA	"	55-3602 thru 3701	100	F-100F-15-NA	-262	59-2558 thru 2563
				F-100F-20-NA	-255	58-1205 thru 1233
						Total
						2,294

SPECIFICATION

	F-100A	F-100C	F-100D
Span	38 ft. 9 $\frac{3}{8}$ in.	38 ft. 9 $\frac{3}{8}$ in.	38 ft. 9 $\frac{3}{8}$ in.
Length	47 ft. 1 $\frac{1}{4}$ in.	47 ft. 1 $\frac{1}{4}$ in.	49 ft. 4 in.
Height	15 ft. 6 in.	15 ft. 6 in.	16 ft. 2 in.
Wing Area	385 sq. ft.	385 sq. ft.	400 sq. ft.
Engine	J57-P-7	J57-P-21	J57-P-21, or 21A
Thrust (Military)	9,700 lb.	10,200 lb.	10,200 lb.
Thrust (Afterburner)	14,800 lb.	16,000 lb.	16,000 lb.
Weight, Empty	18,185 lb.	19,270 lb.	20,638 lb.
Weight, Takeoff	28,899 lb.	32,615 lb.	34,050 lb.
Weight, Maximum Ferry	—	35,696 lb.	37,124 lb.
Weight, Combat	24,996 lb.	27,585 lb.	28,847 lb.
Fuel, Internal	744 gal.	1,702 gal.	1,739 gal.
Fuel, Maximum	1,294 gal.	2,139 gal.	2,139 gal.
Speed, Top (at 35,000 ft.)	852 m.p.h. (740 kts.)	925 m.p.h. (803 kts.)	910 m.p.h. (790 kts.)
Speed, Av. Cruising	589 m.p.h. (512 kts.)	593 m.p.h. (515 kts.)	590 m.p.h. (512 kts.)
Speed, Stalling	159 m.p.h. (138 kts.)	178 m.p.h. (146 kts.)	169 m.p.h. (147 kts.)
Service Ceiling	44,900 ft.	38,700 ft.	36,100 ft.
Combat Ceiling	51,000 ft.	49,100 ft.	47,700 ft.
Climb	23,800 ft./1 min.	21,600 ft./1 min.	19,000 ft./1 min.
Combat Radius	358 miles (311 kts.)	572 miles (497 kts.)	534 miles (464 kts.)
Ferry Range	1,294 miles (1,124 kts.)	1,954 miles (1,697 kts.)	1,995 miles (1,750 kts.)

This data is from the official Standard Aircraft Characteristics charts dated January 1961 (F-100A), and September 1963 (F-100C and F-100D).