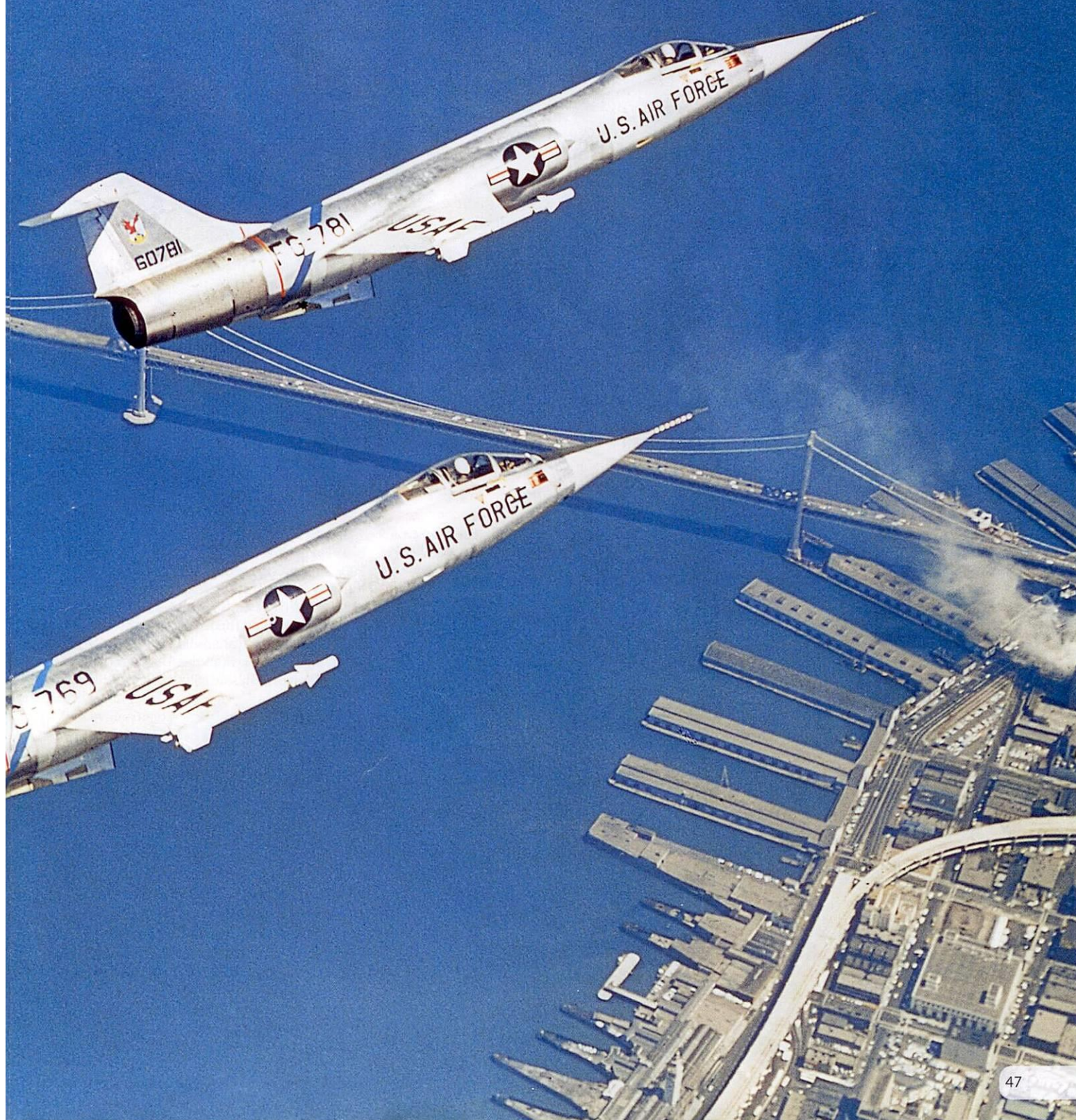


absolute STARFIGHTERS

THE RECORD-BREAKING F-104s



Glory Days



In 1958, just months after the F-104A entered service with Air Defense Command (ADC), Lockheed and the Pentagon decided to show the world the incredible speed and climb performance of the Starfighter by making a series of record flights. Presented here is an in-depth history of those flights, including first-hand accounts from the three living pilots who pushed their Starfighters to the edge.

report: **Stephen Chapis**

AS THE COLD War heated up in the late 1950s, American and Soviet pilots were frequently breaking world records as they pushed their newest fighters faster and higher in a global duel of aerial one-upmanship.

The first such attempt by the F-104 was the absolute world altitude record. This would require the pilot to fly at maximum speed at a specific altitude and pull up into a steep zoom climb, thus converting kinetic energy into potential energy. The selected aircraft, JF-104A serial 55-2957, received a number of modifications for the altitude flights. The YJ79-GE-7 engine was installed, which required extra cooling doors for increased ground cooling. The gun and fire-control systems were removed to save weight, but this required 243lb of ballast in the nose cone and another 220lb behind the cockpit in order to maintain the correct center of gravity. A recuperator tank was fitted in order to maintain fuel flow during negative g when 'going over the top'. The rest of the aircraft was as delivered from the Lockheed Aircraft Corporation.

Lockheed engineering test pilots J. F. Holliman and William C. Park flew '957 on nine occasions between April 21 and April 30, 1958 to develop the optimum technique for obtaining maximum altitude, based in part on information from an IBM 704 Digital Computer. On April 30, Maj Howard 'Scrappy' Johnson made his first of six indoctrination flights. 'Scrappy' had been flying F-86D Sabres at Castle AFB, California when he heard that the 83rd Fighter Interceptor Squadron (FIS) would be receiving F-104s, and managed a transfer to that unit. In his autobiography 'Scrappy', Maj Johnson gives a vivid account of the first world record set by the F-104. On the morning of May 7, 1958, he was ready for an official record attempt — his total F-104 time stood at just 30 hours.

A number of Lockheed executives and other dignitaries watched as Johnson launched out of Palmdale and climbed to 35,000ft while heading west towards Santa Barbara. He lit the afterburner, made a wide 180-degree climbing left turn, pointed the needle-nosed Starfighter towards Edwards AFB and accelerated to Mach 2.23. By the time Johnson announced his arrival over Edwards with a thundering sonic boom he had climbed to 45,000ft. Executing a gentle 2.7g pull into a 52-degree climb, the F-104 rocketed towards the heavens. To ensure he established the correct climb angle, engineers had drawn a line on the canopy for Johnson to align with the horizon. When he shot through 63,000ft at Mach 1.25 the afterburner blew out, followed seconds later by a total flame-out at 67,000ft. Johnson's MC-4 partial-pressure suit was now inflated as the F-104 continued its ascent. After the flame-out Johnson said all he could hear was the sound of his own breathing. As he approached 90,000ft he pushed the stick forward and went over the top, the airspeed indicator showing a mere 30kt.

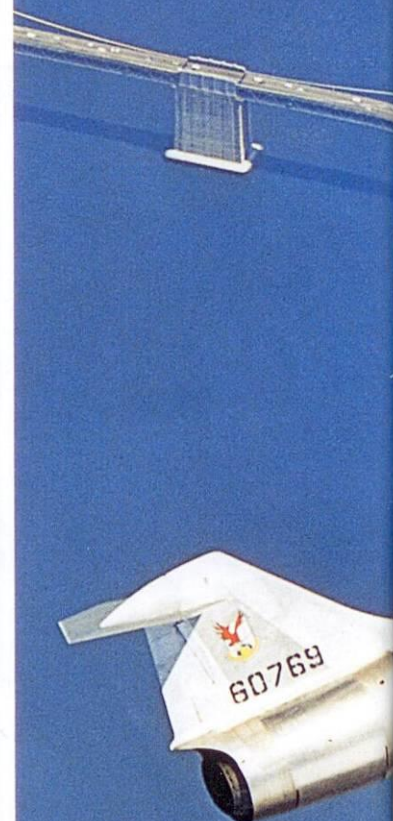
Johnson recalls today, 'When I went over the top the sky was a dark purplish-blue and I could see the curvature of the Earth. >

'When I went over the top the sky was a dark purplish-blue and I could see the curvature of the Earth. A Lockheed engineer said I could have seen Salt Lake City if my eyes were good enough'

Maj Howard 'Scrappy' Johnson

This photo: Maj Howard 'Scrappy' Johnson joined the 83rd Fighter Interceptor Squadron (FIS) to gain experience of the F-104. In December 1957 the unit received F-104As at Hamilton AFB, California, and became the first operational Starfighter squadron in Air Defense Command. Thomas Newdick Collection

Left: Capt Walter C. Irwin, photographed on May 13, 1958, during his absolute world speed record flights. Lockheed



A Lockheed engineer said I could have seen Salt Lake City if my eyes were good enough.'

On his way back down, the radar operator at Edwards informed Johnson that he had topped out at 91,249ft, which shattered the previous record by 14,000ft. Johnson turned towards Palmdale, air-started the J79 at 47,000ft, and made an uneventful landing. Later that year, Vice-President Richard M. Nixon presented him with the 1958 Collier Trophy at a dinner in Washington DC.

In the years after the altitude-busting flight, Johnson fielded a lot of questions about the record, especially during times of jocularity and libation. The most frequently-asked question was why he was selected: 'After I did the record I'd be in an officers club where there was drinking going on. Guys would ask why I was picked for the flight. After a while I came up with a good answer: I'd say they knew after this record was broken there would be a lot of pictures of the pilot and I was the best-looking. That shut them up.'

Absolute world speed record

On March 25, 1955, Lockheed test pilot Ray Goudey took the second XF-104 prototype out to Mach 1.79 — 1,150mph. That speed was attained with the small Wright J65 engine. Just a month later, on April 27, Joe Ozier flew a J79-powered F-104A to an incredible 1,320mph — the magic Mach 2.

During Operation 'Fire Wall' on December 12, 1957, Maj Adrian Drew flew the sole McDonnell JF-101A Voodoo (serial 53-2426) to an absolute world speed record of 1,207.6mph. The gauntlet had been thrown down, and, in May 1958, 83rd FIS pilot Capt Walter C. Irwin, flying the first pre-production YF-104A (serial 55-2969), picked it up. Like 'Scrappy' Johnson before him and Einar Enevoldson and William T. Smith six months later, Irwin had less than 40 hours in the F-104 and would have precious few practice flights before making a formal record attempt.

Irwin would conduct his speed runs at 40,000ft through a 10.1-mile timed course at Edwards AFB with 4.65-mile entry/exit points. While Irwin was within this 19.4-mile corridor he could not stray off his altitude by more than ± 162 ft, no small feat at 1,500mph. Irwin's flight was watched by four observers and two cameras on the ground and a pair of T-33s orbiting 1,000ft above the entry/exit points.

On May 13 and 14, Irwin made half a dozen flights to get a feel for both the aircraft and the course. On the 15th he completed three flights; during the first he strayed off altitude. The second flight was a good run, but not fast enough. The downwind run on his third attempt was clocked at 1,500mph, but, after he completed his teardrop turn to re-enter the course, a wire in the afterburner nozzle controller broke and the run was aborted.

When Irwin was selected for this record attempt he was told by several generals that they would like to get the speed record for Armed Forces Day on Saturday, May 17. Irwin's first run at 06.50hrs on May 16 averaged 1,435mph — a new record... or so they thought. Word came from the course that a camera had failed. The run was disqualified. Irwin was airborne again an hour later, but as he was climbing to

altitude he received news that one of the T-33 observers had to abort; luckily the spare aircraft took its place. Irwin's downwind run through the course was clocked at 1,465.41mph. It was looking good. He made a smooth teardrop turn and re-accelerated as ground controllers vectored him back into the course. His upwind run was hampered by a 70kt headwind, but he still completed it at 1,342.97mph. Irwin's two-run average was 1,404.19mph. An un-named general said, 'I'll buy that', and marched off to tell the press that the F-104 had become the first aircraft in history to hold the world speed and altitude records simultaneously.

Time to climb

With the speed and altitude records in hand, Lockheed set out to demonstrate the F-104's prowess as an interceptor by going after time-to-climb records in December 1958. Based at Larson AFB, Washington, the 538th FIS became just the fourth squadron to receive the F-104. Two young lieutenants, Einar Enevoldson and William Smith, were selected for the project. Enevoldson signed up for the US Air Force on a whim in 1954 after dropping out of UCLA in his senior year. Smith joined the USAF in 1952 and

spent two years as an enlisted jet mechanic before applying for the Aviation Cadets in 1954. Both went through F-86 transition training at Perrin AFB, Texas and flew F-86Ds in the 538th for nearly four years before the squadron received the F-104.

In 2013 both men shared their thoughts about transitioning from the F-86 to the F-104. Enevoldson said, 'I'll tell you, that

'For this flight I'd accelerate to 150kt, get the gear up and manipulate the stick to keep from scraping the belly while accelerating to 300kt, and execute a 3g pull and go straight up to 10,000ft. That worked really slick'

Einar Enevoldson





THE FASTEST WOMAN IN THE WORLD

In 1962 Lockheed produced a TF-104G (c/n 5702) for the West German Luftwaffe, but decided to retain the aircraft as a customer demonstrator and promotional aircraft with the US registration N90500 and nickname *Free World Defender*. What better way to promote a new fighter than to have aviatrix Jacqueline Cochran set a few women's world speed records?

All of Cochran's records took place at Edwards AFB, and many of her flights broke records that she had previously set in other aircraft. Her first record flight in N90500 was over a straight 15/25km course on April 12, 1963, where she was clocked at 1,273.11mph. On May 1 she averaged 1,203.68mph over a 100km-closed course, which surpassed her previous record of 784.289mph set in a Northrop T-38 Talon on October 6, 1961.

In spring 1964 Cochran was back at Edwards for more, this time in a single-seat F-104G. On her first two flights she would go after her own 15/25km and 100km records. On May 11 she shattered the former at a blistering 1,429.3mph, while the latter record fell on June 1 with a new speed of 1,303.18mph.



For her final triumph Cochran sought to beat her own 500km closed course record. On May 23, 1963 she had flown a Canadair-built F-86E to an average speed of 590.32mph. At that time the F-86 was considered the best fighter in the US arsenal after racking up an impressive kill ratio against communist-flown MiG-15s during the Korean War. On June 3, 1964 Cochran crushed the 500km record at 1,127.40mph, and definitively rendered the Sabre a has-been in the supersonic age of fighter aircraft.



Inset: Jacqueline Cochran pictured during 1964 in a single-seat F-104G. Lockheed

This photo: TF-104G serial N104L also wore the registration N90500 and was built for the Luftwaffe. It was photographed here on May 2, 1963, during Cochran's record-breaking flights. Lockheed

was great; everybody else was flying Mach 1 and we were flying Mach 2! It was so nice to fly and had such tremendous performance'. Smith's comments put into greater perspective what an impressive machine the Starfighter really was in 1958: 'I thought the F-104 was the greatest airplane ever. It was so far ahead of its time. We were flying Mach 2 while the airlines were still flying propeller-driven aircraft.'

Enevoldson explained how he and Smith were selected: 'I was a brand-new 1st Lt with about 15 hours in the airplane. I was pretty junior so I was not one of the first pilots to get checked out. Lockheed went to the Pentagon and said they believed the F-104 could break some records. Once it was approved, the Air Force looked at the records and saw nothing special about them — all were well within the normal operating parameters of the aircraft — and decided to assign the record attempts to an operational squadron. Our squadron commander said he could do the records himself but he was going to retire soon, so he decided to give them to a junior pilot, thinking it might be a career-booster. I could have done all the records myself, but Bill and I split them up. I thought the 3,000m and 25,000m records would be the most >

Above left: Maj Howard 'Scrappy' Johnson had notched up just 30 flight hours in the F-104 when he made his first world altitude record attempt. Maj 'Scrappy' Johnson

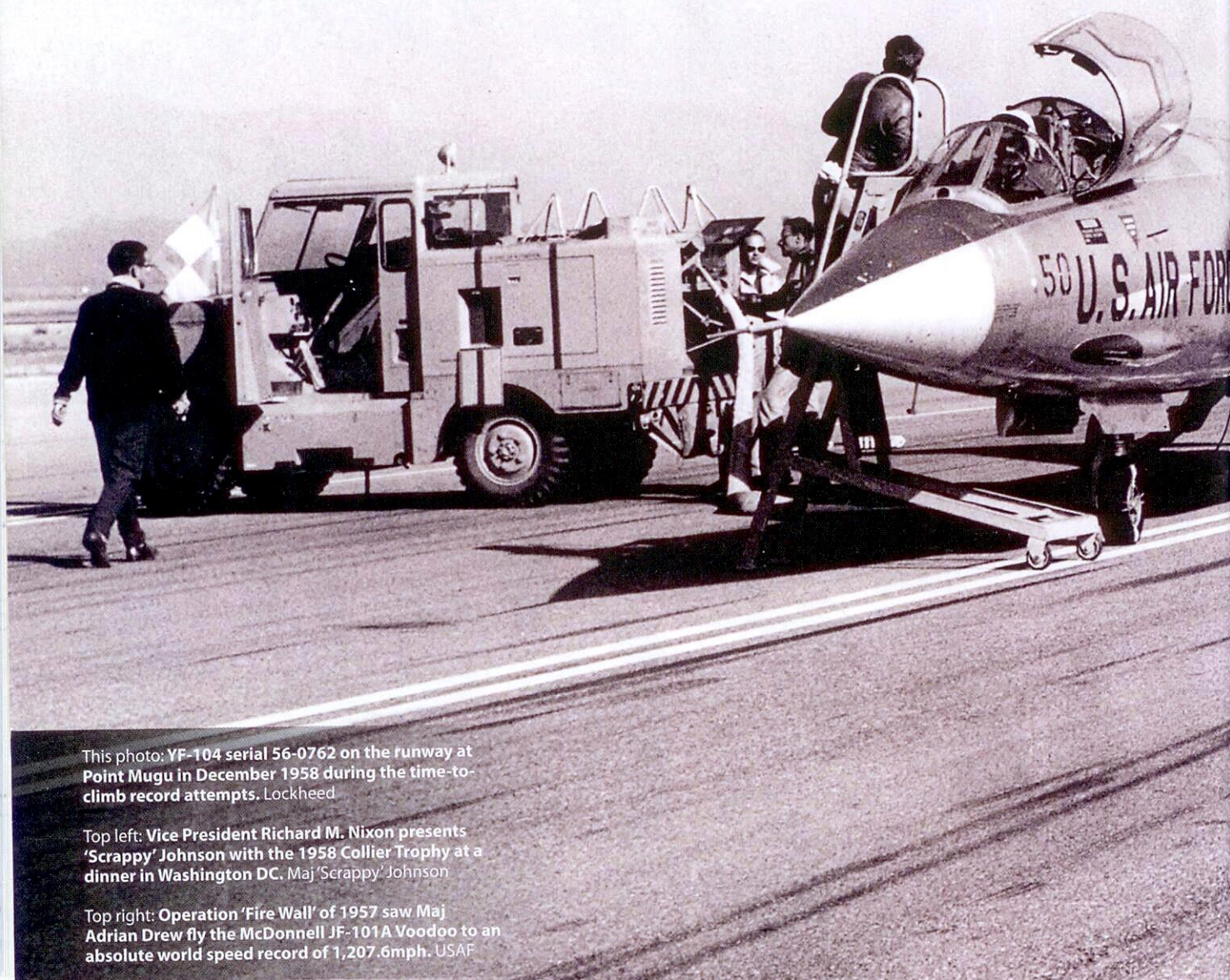
Right: 'Scrappy' Johnson climbs from the JF-104A at Palmdale following his record-breaking flight. Maj 'Scrappy' Johnson





challenging, so I took those and Bill and I split the rest'. Smith chuckles as he recalls how the flights worked out: 'We traded flights but I ended up with four records while Einar had three'. Although William went on to log over 1,100 hours in the Starfighter, at the time he had also notched up just 40 hours on type.

Enevoldson and Smith went down to Lockheed's Palmdale facility where they picked up F-104A serial 56-0762. This early-build Starfighter later achieved fame as the NF-104 lost during 'Chuck' Yeager's ill-fated altitude flight. Enevoldson described the modifications made to the aircraft: 'They gave us one with an aluminum tail, which was lighter than the later stainless-steel tails. They also took out any equipment we did not need, but they had to be careful because the airplane could end up tail-heavy — and it still came out a little tail-heavy. When we came back from a flight we had to sit in the airplane until they put some gas in it, otherwise it would sit back on its tail! They also increased the engine operating



This photo: YF-104 serial 56-0762 on the runway at Point Mugu in December 1958 during the time-to-climb record attempts. Lockheed

Top left: Vice President Richard M. Nixon presents 'Scrappy' Johnson with the 1958 Collier Trophy at a dinner in Washington DC. Maj 'Scrappy' Johnson

Top right: Operation 'Fire Wall' of 1957 saw Maj Adrian Drew fly the McDonnell JF-101A Voodoo to an absolute world speed record of 1,207.6mph. USAF

temperature by about 15 degrees and increased the afterburner fuel flow by 25 per cent.'

The time-to-climb flights took place at Naval Air Station Point Mugu, California, because it was at sea level and equipped with missile-tracking radars to follow the F-104 at high altitude. To ensure that the Starfighter was making maximum power when it launched, the groundcrew devised a crude, but ingenious method to hold the F-104 back while Enevoldson and Smith ran up the power for launch. In today's over-regulated and over-litigated society this method would not even be considered. Enevoldson describes the launch: '...they removed the drogue chute and installed an explosive bolt in the drogue chute shackle. After the aircraft was towed into position they had a 300ft cable with one end hooked to that explosive bolt and the other end to a truck loaded with 60,000lb of PSP matting. We'd start the engine, release the brakes, run the power up to full afterburner and watch the fuel gauge; >





Left: Capt Joe Jordan with F-104C serial 56-0885, which received considerable modifications courtesy of the AFFTC Power Branch and General Electric. USAF

This photo: In May 1958 Capt Walter C. Irwin, flying the first pre-production YF-104A (serial 55-2969), started his formal world speed record attempts at Edwards AFB. Lockheed

Inset (right): YF-104 serial 55-2969 is prepared for one of Capt Walter Irwin's world speed record flights in May 1958. Lockheed



'I thought the F-104 was the greatest airplane ever. It was so far ahead of its time. We were flying Mach 2 while the airlines were still flying propeller-driven aircraft'

William T. Smith

when it reached the calculated amount of fuel needed for the record plus a little for landing we'd pull the gun trigger on the stick to blow the bolt. For the 3,000m flight I only had 800lb on board. When I pulled that trigger the jet really shot out there!' Smith adds, 'It was quite an experience. When we pulled the trigger it set off a flash bulb and started a movie camera and the timing gear.'

Enevoldson described his first record flight, which nearly ended in disaster. 'We did the 3,000m flight first. It was late afternoon on [December 13, 1958]. It was a bit rushed because we could see the fog coming in from the sea. For this flight I'd accelerate to 150kt, get the gear up and manipulate the stick to keep from scraping the belly while accelerating to 300kt, execute a 3g pull and go straight up to 10,000ft. That worked really slick. I was about half-way down the runway when I hit 300kt and when I pulled up I went right through the fog bank. Because of the altimeter lag, and with me being a little slow coming out of afterburner I was at 18,000ft before I Immelman'd out and rolled upright. When I looked at my fuel gauge I saw that I had 200lb of gas and I thought, 'Oh, that's not good.'

At this point in his narrative Enevoldson took the time to talk about a Lockheed

maintenance man who saved the entire time-to-climb program. 'The F-104's main fuel tank is divided into forward and aft sections, with the engine being fed from the forward section. There is a bulkhead in the middle with a flapper door so once the fuel goes forward it can't go back. The chief of maintenance on night shift at Palmdale was a gentleman named Irving Prue. He came to me and said he'd been thinking about this flight. He said that when I pulled the trigger and accelerate, the fuel in the tanks was going to shoot to the back of each half of the tanks, and even though the fuel gauge would say I had 800lb I would only have 400lb available and I'd flame-out shortly after pulling to the vertical. Then he said he had a plan. He said the aux tank feeds the forward tank and his crew would fill the forward tank from the aux tank and the flapper valve would keep the fuel from going to the rear tank. I asked how he knew the flapper would not leak; he said he'd test it overnight. It worked. Irving Prue saved the program. We would have had zero success if it hadn't been for him. Nobody else ever thought of that problem.'

In spite of this, now on the first flight Enevoldson was at 18,000ft and on the verge of running out of fuel. 'Everything was normal until I was on base leg. It was smoggy

and I was looking right into the sun and could not see anything, absolutely nothing that resembled a runway. The fog had really rolled in and gotten thick, so I went down into the shadow of the fog until I was 30ft above the orange trees. Now in the fog's shadow I could see better and what I saw was not good. I was very close to the runway and about 1,000ft off the centerline. The airplane was light so I was able to make a hard turn, get lined up, and touched down. On roll-out I went right into the fog bank. That hard turn I made to get on the runway would have been suicide in a standard-weight F-104 at that speed and altitude.'

After Enevoldson shut down, the groundcrew informed him that he had narrowly averted a second disaster. After the launch the driver of the PSP-laden truck started to pull off the runway and stalled the engine. During Enevoldson's short flight the driver sat helplessly on the runway trying to re-start the stubborn machine. He finally got it going and had just cleared the runway when Enevoldson came screaming in on final approach and into the flare, narrowly missing the unseen truck.

Despite the drama, Enevoldson's flight was hugely successful. It had taken just 41.85 seconds to go from brake release to



3,000m, bettering the previous records by four seconds. The Starfighter was fueled and prepared for William Smith's attempt at the 6,000m record the next morning. On that flight Smith climbed to 6,000m in just 58.41 seconds. He also set new records by climbing to 9,000m in 81.14 seconds, and 20,000m in 222.99 seconds (3 minutes 42 seconds). The latter and Enevoldson's final climb to 25,000m established new records since, at that time, no other aircraft was capable of climbing to the very edges of space.

Smith recently recalled his final flight to 20,000m (65,617ft) and highlights why radar tracking was so important. 'For our final flights Einar and I leveled off at 35,000ft to re-accelerate and continue our climb. We chose 35,000ft because it was very cold at that altitude that day. On my flight I accelerated to Mach 1.85 and pulled maybe 1.5g until I reached the proper climb angle. We had grease marks on the canopy to help us see the attitude of the airplane, which I think was about 60 degrees. I don't remember what my maximum altitude was because the altimeter only went to 65,000ft. Going over the top I flew very gently because I wanted to be sure the tail stayed behind me!' For these high-altitude flights Enevoldson and Smith wore the MC-4 partial-pressure suit. To ensure

the suit worked properly, Smith dumped the cabin pressure while re-accelerating at 35,000ft.

Enevoldson also recalls vividly his final flight. 'The 25,000m flight was pretty neat. I went straight up to 35,000ft and leveled off to re-accelerate. At Mach 1.5 I began a 1.25g pull to a 45-degree climb, but the aircraft had so much power that it would accelerate to Mach 2 during the pull-up! I would hold that climb angle until I went through 25,000m, and while going over the top I held about 2 to 3 degrees angle of attack, by which time I was 60-70 miles out to sea. I descended to about 50,000ft, re-started the engine and landed.'

When the numbers came back, they were simply astounding: Enevoldson had gone from brake release to 25,000m in 266.03 seconds (4 minutes 24 seconds). The average climb rate was nearly 21,000ft per minute, which included the temporary leveling-off to re-accelerate. As Enevoldson went over the top he took stock of how far, not to mention how high, he had come in his short Air Force career. He also had an idea: 'During the lower-altitude flights I didn't really look outside because I was concentrating on the attitude indicator, but on the higher flights I did look outside and it was an awesome sight. I remember once glancing at the altimeter and

being amazed that the 'thousands' hand was a blur! I thought, 'Wow, this thing is really going up!' On the 25,000m flight I went to about 90,000ft (27,432m) on the overshoot and thought we should go for an altitude record, which was about 91,000ft (27,736m) at that time. It would not have been hard to do at all. We got Lockheed to make a big pitch to the Air Force to let us go for the altitude record. They hemmed and hawed for a couple days and finally turned us down, and Joe Jordan did it a year later.'

Raising the bar

'Scrappy' Johnson's 15-month-old altitude record fell on September 4, 1959 when Soviet pilot Vladimir Ilyushin raised the record to 94,658ft in the Sukhoi T-431 (a prototype Su-9). That October, the Air Force Flight Test Center (AFFTC) submitted a formal request for an attempt on Ilyushin's record. Engineering studies indicated that a modified F-104C had the capability to surpass the Soviet record by the required 3 per cent. On November 20 a meeting was held at Edwards AFB between Lockheed, General Electric Company, and AFFTC personnel to finalize planning and co-ordination for the attempt.

The aircraft chosen was F-104C serial 56-0885, which was flown from Kirtland



AFB, New Mexico to Lockheed Palmdale on November 24 for modifications. A J79-GE-7 engine was installed in the aircraft. While this was the same type of engine used in Johnson's F-104A, the unit in '885 received considerable modifications by the AFFTC Power Branch and General Electric. Maximum rpm was set at 103.5 per cent, the afterburner fuel control was trimmed to provide 10 per cent more fuel flow, minimum engine fuel flow could be reduced from the normal 500lb per hour (pph) to 250pph, the maximum compressor inlet temperature (CIT) was increased from 121°C to a maximum 199°C, and finally the ignition timer was bypassed and connected to a switch in the cockpit to provide continuous ignition. This switch would be activated by the pilot just prior to the zoom climb and provided for automatic re-start capability in case of a flame-out. In addition, this set-up also meant the pilot merely had to open the throttle to get the engine restarted during descent. Additional modifications included installing

a larger vertical tail from an F-104B, extension of the inlet cones to better position the shock wave at high supersonic speeds, and pilot-selectable positions for the 10 bypass doors in the engine inlet duct. The radar set was also removed so a photo panel and two Fédération Aéronautique Internationale (FAI) barographs could be installed.

The aircraft was ready for a shake-down flight by a pilot named Kitchens on December 2, with two more sorties the following day. Then, on December 6, CDR Lawrence E. Flint, Jr beat the Soviet benchmark when he flew a McDonnell F4H-1 Phantom II to 98,557ft as part of Project 'High Jump'. With the record now back in American hands it seemed the F-104 attempt might be in doubt, but the Air Force was allowed to continue. After all, there was more than just US and Soviet bragging rights at stake — Air Force versus Navy bragging rights were on the line as well.

After a four-day lay-off, Kitchens began flying again on December 7, completing five sorties over the next three days that tested stall characteristics, speed expansion, stability, and zoom climbs as high as 80,000ft. When Capt Joe Jordan made his first flight in the aircraft on December 10 he immediately zoomed to 95,200ft.

Joe Jordan sadly passed away many years ago, but, thanks to a report written by Jordan and Project Engineer Johnny Armstrong, we have an excellent narrative of what happened in the cockpit of '885 on December 14, 1959.

Jordan flew to a point approximately 80 miles from where he would start the zoom; this would give him adequate space to get the F-104C to its maximum speed. Acceleration was moderate from Mach 0.9 to 1.4, but then the jet quite literally leapt to Mach 2.35. As Jordan hit Mach 2.0 he dumped the cabin pressure to test his pressure suit and oxygen system, after which he flipped on the constant ignition, minimum fuel reset, and test instruments. At 39,575ft and Mach 2.35, Jordan began his pull-up. For the first

few degrees he only put 1.3g on the aircraft but then he rapidly increased the pull to 3.15g until he established a 49.5-degree climb angle. When the afterburner blew out at 70,000ft Jordan retarded the throttle to military power, but he was still going upstairs like a bat out of hell at Mach 1.78. At 81,700ft the J79 finally flamed out and, even though Jordan had slowed to Mach 1.42, he coasted another 21,000ft until he reached his peak altitude of 103,395ft, at which time his indicated airspeed was just 54kt. At that moment, nearly two-and-a-half years before Yuri Gagarin and Alan Shepard rode their rockets into space, no other human being had flown to such an extreme altitude — an incredible 19.5 miles above the Earth.

Jordan had just a few scant seconds to take in the heavenly view outside because his flight was half over. As he flew along at Piper Cub speed, Jordan found that the ailerons had little effect on lateral control, but the jet was easily controlled with the rudder. At the same time Jordan was riding a fine line of controllability in pitch by holding the stick *almost* fully aft. If he went too far aft the stick shaker would activate. Meanwhile, if the stick went too far forward the F-104 would go into a potentially deadly lateral-directional oscillation. No matter how Jordan moved the stick he noted that it had no apparent effect on the jet's flight path: it only seemed to rotate around its center of gravity.

Once Jordan descended through 70,000ft the aircraft was responding normally. He re-started the engine and landed back at Edwards. Then it was over. In an amazing 19-month period, five pilots had captured 10 world records for the F-104.

Today's fourth- and fifth-generation multi-role fighters are packed with the latest digital avionics, smart weapons, stealth, and blessed with incredible maneuvering capability but few, if any, can match the absolute speed and climb performance of the Lockheed Starfighter. ☐



Left: Capt Joe Jordan in his pressure suit. He made his first flight in F-104C '885' on December 10, 1959, and immediately flew to 95,200ft. USAF

Right: On December 14, 1959, Joe Jordan was tearing along at 39,575ft and Mach 2.35 when he began his pull-up. His afterburner blew out at 70,000ft, but he was climbing fast at Mach 1.78. At 81,700ft the J79 finally flamed out, but he was still at Mach 1.42 and coasted another 21,000ft until he reached his peak altitude of 103,395ft. No other human being had flown to such an extreme altitude. USAF

Below: Capt Joe Jordan's F-104C serial 55-0885 on the flight line at Edwards AFB. USAF

Box, below right: Darryl Greenamyer with the *Red Baron*. The aircraft was lost at Tonopah Airport on February 26, 1978. Tony Landis via author

Box, inset right: Lockheed test pilot Darryl Greenamyer flying the *Red Baron* over Mudd Lake in October 1977. His four-run average speed over 3km was 988.260mph — a world record that still stands. Paul J. Burke via author



THE STARFIGHTER RECORD THAT STILL STANDS

By the end of the 1960s, all of the records described in this article had fallen to other aircraft — many to the same Soviet types the Starfighter was built to defend against. On April 28, 1961 Joe Jordan's altitude record was broken when Georgi Mosolov flew a Mikoyan-Gurevich Ye-66A (an experimental MiG-21) to 113,891ft. This did not sit well with Lockheed test pilot Darryl Greenamyer, and he decided that he would take it back for the United States. In 1965 Greenamyer began to scour the US for F-104 parts to build his own hybrid Starfighter.

After a decade of construction the *Red Baron* took to the skies for the first time in September 1976. The *Red Baron* had an empty weight of 11,500lb, a full 3,400lb lighter than the penultimate version of the Starfighter, the Aeritalia F-104S (see *Combat Aircraft* March 2013). Greenamyer had acquired an F-4-spec J79-GE-10 from the US Navy that produced 18,000lb of thrust. This gave the *Red Baron* a thrust-to-weight ratio greater than 1:1, better than any fighter of the time, including the McDonnell Douglas F-15 Eagle. The performance of the engine was further enhanced with water-injection and nitrous oxide systems.

Greenamyer was going to need every ounce of power, for while he was still building the aircraft Mikoyan-Gurevich test pilot Alexander Fedotov zoomed a Ye-266 (an experimental MiG-25) to 118,898ft on July 25, 1973. Now Greenamyer would have to climb to at least 122,464ft to beat Fedotov's record.

The *Red Baron* was conceived to assault the world altitude record, but to help raise a sponsor



Greenamyer first went after the low-altitude 3km world speed record then held by the US Navy's LT Huntington Hardisty and LT Earl De Esch in an F4H-1 Phantom II known as *Sageburner*. On October 24, 1977, flying just 30ft over a dry lake bed 30 miles south of Tonopah, Nevada, Greenamyer's four-run average was 988.260mph — a new world record.

Now Greenamyer turned his sights towards the altitude record, which Fedotov raised to 123,520ft on August 31, 1977. Greenamyer would now have to take the *Red Baron* up to 128,000ft to beat the Soviet benchmark. Test flights were going well until February 26, 1978. Upon returning to Tonopah Airport, Greenamyer entered the pattern when he saw that the left main gear would not lock. After numerous attempts to fix the problem, Greenamyer was finally forced to eject from the aircraft. After nearly 10 years of construction the *Red Baron* was gone in just seconds. Although he would never capture the altitude record, Greenamyer's 3km world speed record still stands today — 36 years later.

