AIRCRAFT

PROFILE

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Boeing B-52A/H Stratofortress

by Peter M. Bowers

The prototype Boeing XB-52 (USAF serial number 49-230) on an early test flight accompanied by a North American F-86 Sabre "chase plane". The device at the top of the vertical fin is part of the test equipment. (Photo: Boeing)

Boeing B-52A/H Stratofortress

by Peter M. Bowers

THE EIGHT-ENGINE, swept-wing Boeing B-52 Stratofortress (the given popular name is rarely used) has been the principal long-range heavy jet bomber of Strategic Air Command (SAC; formed 1946), United States Air Force, since it became operational in 1955.

The B-52 is a distinguished example of active longevity for, 20 years after its first flight, the Superfortress has been heavily engaged in operations over Viet Nam. This may be regarded as the half-way mark for plans are in hand to adapt the B-52 to a new missile weapon system which could keep this Boeing bomber operational and competitive until 1985.

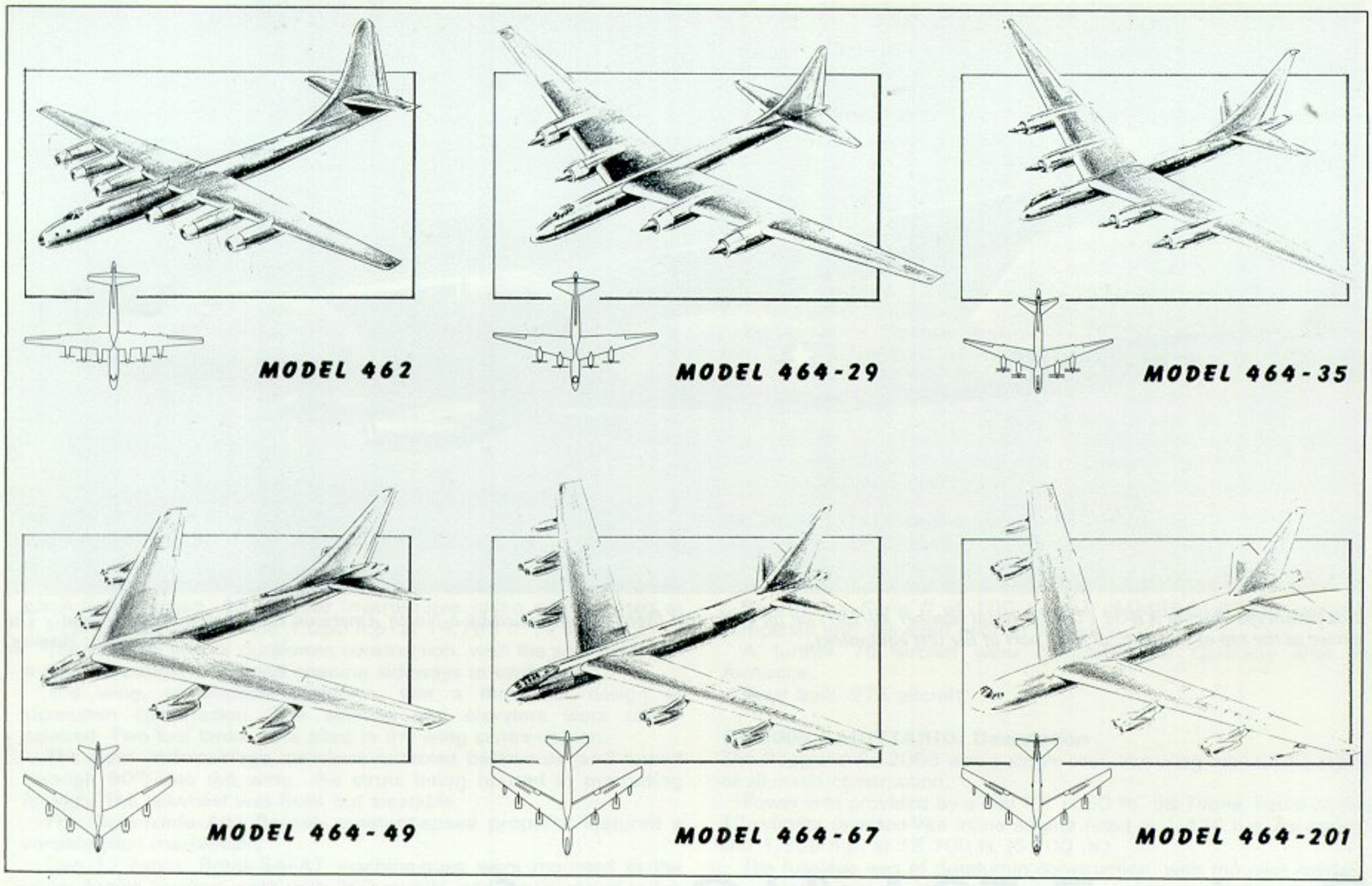
NOT BIGGER B-47

Because of its general configuration, higher B-designation and later date of introduction into service, the B-52 has often and erroneously been regarded as a scaled-up development of the revolutionary Boeing B-47 Stratojet (*Aircraft Profile No. 83*). The B-47, incidentally, was first flown on December 17, 1947, some 52 months before the YB-52 prototype took to the air in April 1952.

Far from being a bigger B-47, the B-52 started along an entirely different line of development. Several major configuration changes were made in the early design stages to adapt the new long-range heavy bomber to the rapidly changing technology of the years immediately following World War Two. Any external similarity with the B-47 was arrived at by evolution and not as a development of that previously-established design.

While the original Air Force designation of B-52 remained constant, the different designs which were evaluated by Boeing must be regarded as entirely different aircraft. In the event, the design study ultimately selected may now be looked upon as an excellent example of a basic design capable of major modification several times after delivery. Indeed, modifications planned to extend the life of the airframe and to adapt the bomber to meet changing operational requirements.

Display model of the Boeing Model 462, photographed in April 1946. This was the original straight-wing, turboprop concept of the B-52, and clearly shows influence of wartime Boeing B-29. (Photo: Boeing)



Six stages of developing the B-52 Stratofortress. (Photo: Boeing)

ORIGIN OF THE DESIGN

Model 462

In June 1946, the Boeing Airplane Company was awarded a United States Air Force contract for design studies of a long-range heavy bomber. The Air Force allocated it the Experimental Bombardment Model number XB-52 while, similarly, Boeing assigned Model 462 for the first basic design study. This resulted in a conventional straight-wing design clearly showing the influence of the wartime Boeing B-29 Superfortress (*Profile No. 101*).

Propeller-turbines – six in all – were selected for the Model 462, the powerplant being the still experimental 5,500 shaft horsepower Wright XT35-W "Typhoon".* The mainplane spanned 221 feet (wing area 3,250 square feet) and the length was 161 feet 2 inches. The gross weight increased with various studies from 360,000 to 400,000 pounds. Initially, the Model 462 was to carry a 9-man crew and up to 10,540 pounds of bombs for a range of 3,100 nautical miles (3,570 statute miles). Top speed was calculated as 382 knots (440 miles per hour) at 35,000 feet. A peculiarity of the design was that the four main wheels of the nosewheel undercarriage each retracted separately into the four inner engine nacelles.

The chief innovation of the Model 462 was, however, the choice of turboprop engines. In this immediate post-war period, the piston engine was about to give way to the jet engine. But the pure jet engine was, for the time being, ruled out because of its high specific fuel consumption. Turboprops would bridge the gap, it was felt, between the reciprocating engine and the gas turbine for bigger aircraft such as transports and long-range bombers. In this case, intercontinental distances for big bombers could be viewed as up to 10,000 miles. The maximum range of the earlier USAF Strategic Air Command "Long Rifle", the six-engine Convair B-36, was in this category.

Deficiency in the desired range was the problem of the initial XB-52/Model 462 design study. The solution materialized when the Air Force decided to adopt the hose and tanker in-flight refuelling system developed in Britain by pioneer Sir Alan J. Cobham's company, Flight Refuelling, Ltd. Although this manually-connected, hose-and-grapnel was not suited to the speeds of new-generation aircraft, it was used on a number of wartime B-29s and post-war B-50As adapted to the technique in 1948. The problem of faster aircraft was resolved when Boeing developed its own "Flying Boom" aerial refuelling system.

Model 464-17

Continuing studies and refinement of the Model 462 resulted in the new designation of Model 464. In the Model 464-17, for example, the number of engines had been cut from six to four and mainplane span reduced from 221 to 205 feet; while retaining the gross weight of 400,000 pounds. Effective range was extended by the use of large external tanks.

Model 464-29

With in-flight refuelling taking care of the range problem, the Air Force Project Office for the XB-52 became

*The Wright XT35-W "Typhoon" was flight-tested in the nose of a Vega-built Boeing B-17G-110-VE (serial 44-85813) operated by the Wright Aeronautical Divn. of the Curtiss-Wright Corp. – EDITOR.

interested in modifications that would increase the bomber's speed. Boeing had been studying improved designs on its own and responded with a new model, the 464-29. This featured a more sharply-tapered wing with 20 degrees of sweepback while retaining the four Wright XT35 turboprops of the 464-17.

A major change was the adoption of a centreline landing gear under the fuselage superficially after the fashion of the B-47 but with the forward and aft units much closer together. On the Model 464-29, the span remained at 205 feet and the weight at 400,000 pounds, but the calculated maximum speed increased to 395 knots (445 m.p.h.).

Model 464-35

Progressive studies and improvements resulted in yet another turboprop model, the 464-35. This variant had co-axial propellers and the wingspan reduced to 185 feet and length to 131 feet 4 inches. But, most important, the weight was reduced to 280,000 pounds. With the same four Wright XT35 turboprops and 1,000 square feet less of wing area, the Model 464-35 promised a top speed of 435 knots (500 m.p.h.) at an altitude of 41,000 feet.

Model 464-40

The development of the large turboprop (XT35) engine was not advancing as rapidly as expected. With an order for two experimental XB-52s pending, it began to look as if no turboprops would be available for them. Turbojets, on the other hand, were improving rapidly. Boeing engineers came to the conclusion that the XB-52 would be better with turbojets than turboprops. To this end they adapted the Model 464-35 airframe to use eight Westinghouse XJ40-WE-12 axial-flow turbojets paired in four nacelles similar to the inboard pods of the B-47. Still in the 280,000-pound weight bracket, the speed increased to 440 knots (507 m.p.h.) at 47,000 feet.

The Boeing engineers took their Model 464-40 studies to the Air Force Project Officer only to find that he too had reached the same conclusion and was about to suggest a turbojet XB-52 to them. Government procurement procedures, however, are of necessity slow and lag way behind the thoughts of project officers and designers. In July 1948, Boeing was awarded a contract for the construction of two experimental B-52s. Although these were to be powered with turboprops, Boeing was urged to continue the turbojet studies.

Models 464-46 and -47

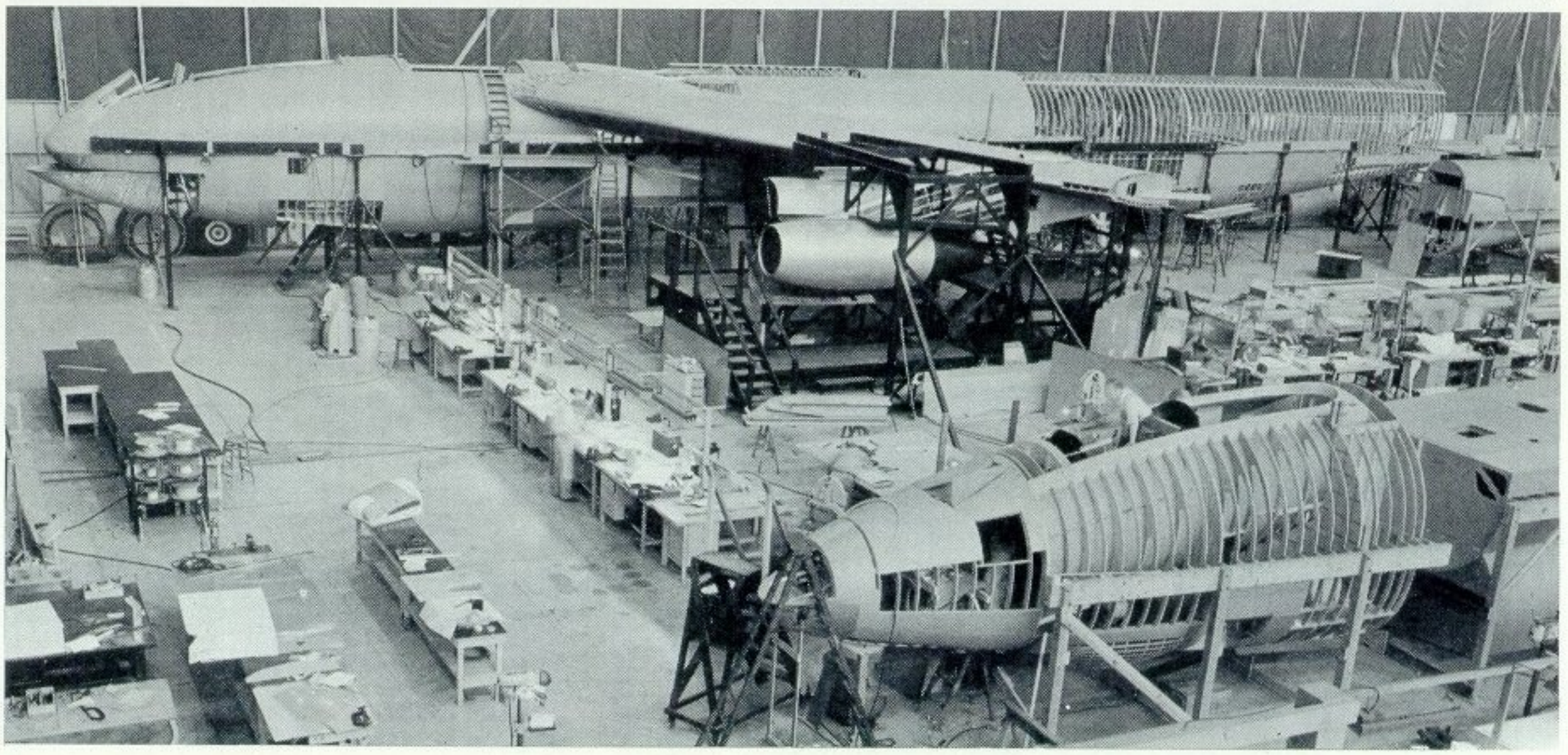
Three months later the Boeing engineers took two revisions of the Model 464-40 to the Air Force at Wright Field. These studies were essentially the same airframe with six J40 engines in a Model 464-46 and the same number of the highly promising axial-flow J57, then under development by Pratt & Whitney in the -47. The Project Officer was impressed but also saw a potential for still more speed. Pointing out that the 20° sweep of the wing was the principal speed-limiting factor, he suggested an increase of sweep angle to raise the speed. This was on a Friday. The Boeing engineers held a short conference and then told the Project Officer that they would be back on the following Monday with an improved design.

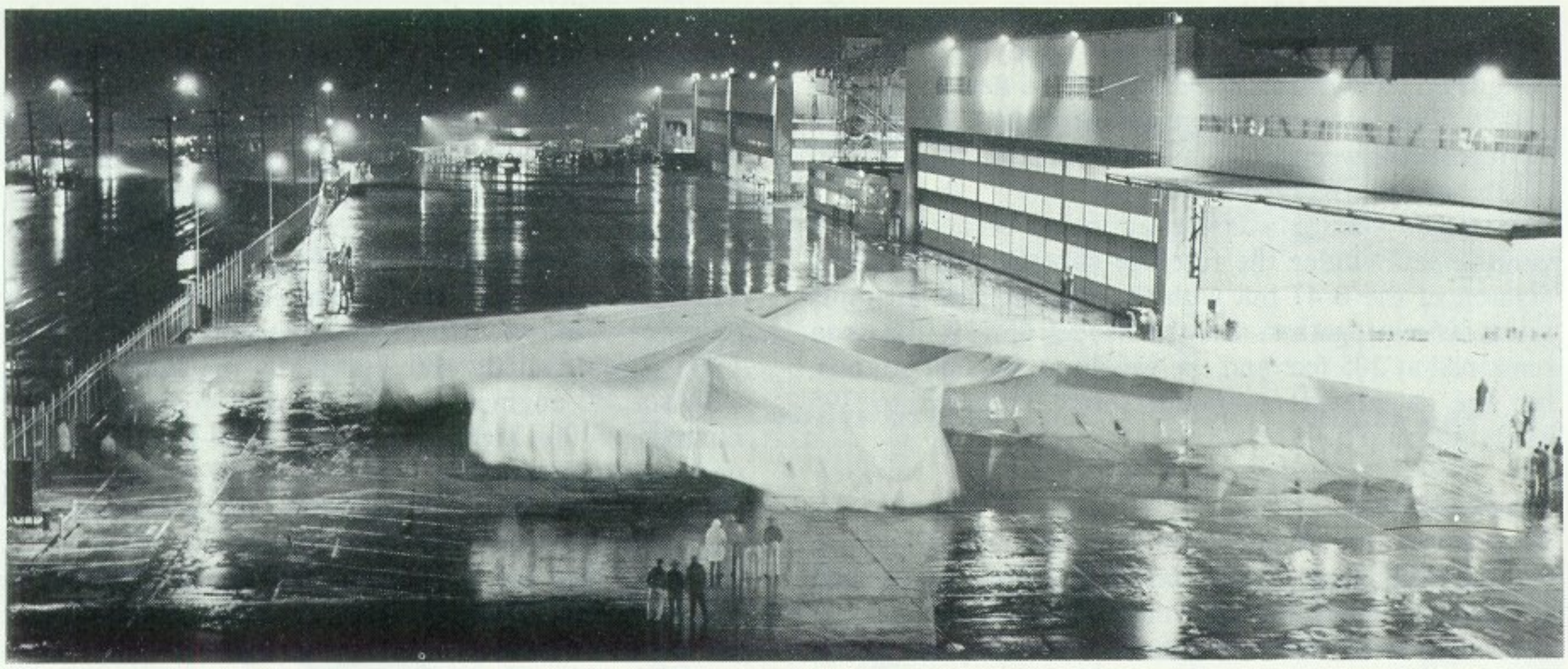
Model 464-49 – the XB-52 emerges

The engineers returned to their hotel rooms where, using research data that they had brought with them, they proceeded to redesign the best features of the Models 464-40 and -47 into a new model, the 464-49, which featured eight J57 engines in the podded arrangement of the 464-40. The wing span was kept at 185 feet, but the sweep was angled a further 15° to 35° and the wing area jumped 1,400 square feet to 4,000 square feet, greatest of any of the XB-52 studies. In spite of this great increase, the gross weight rose to only 330,000 pounds. While one engineer converted the new configuration to model form – with balsa wood hurriedly purchased from a local hobby shop – others organized the revised aerodynamic and structural data into a presentation document that was typed by a public stenographer.

The new model was unquestionably superior to its predecessors in spite of the greater weight. The Air

Full-scale mock-up in September 1950 of Boeing Model 464-67; the eight-jet swept-wing design that was built as the XB-52. (Photo: Boeing)





The completed XB-52 was transferred from the Boeing factory to the flight test hangar under wraps and in great secrecy on the night of November 29, 1951. The fold-down vertical tail was a feature of all subsequent B-52s. (Photo: Boeing)

Force project office was delighted and action was quickly taken to revise the existing contract for turbo-prop XB-52s to allow construction of the redesigned version with eight jets and 35° wing sweep.

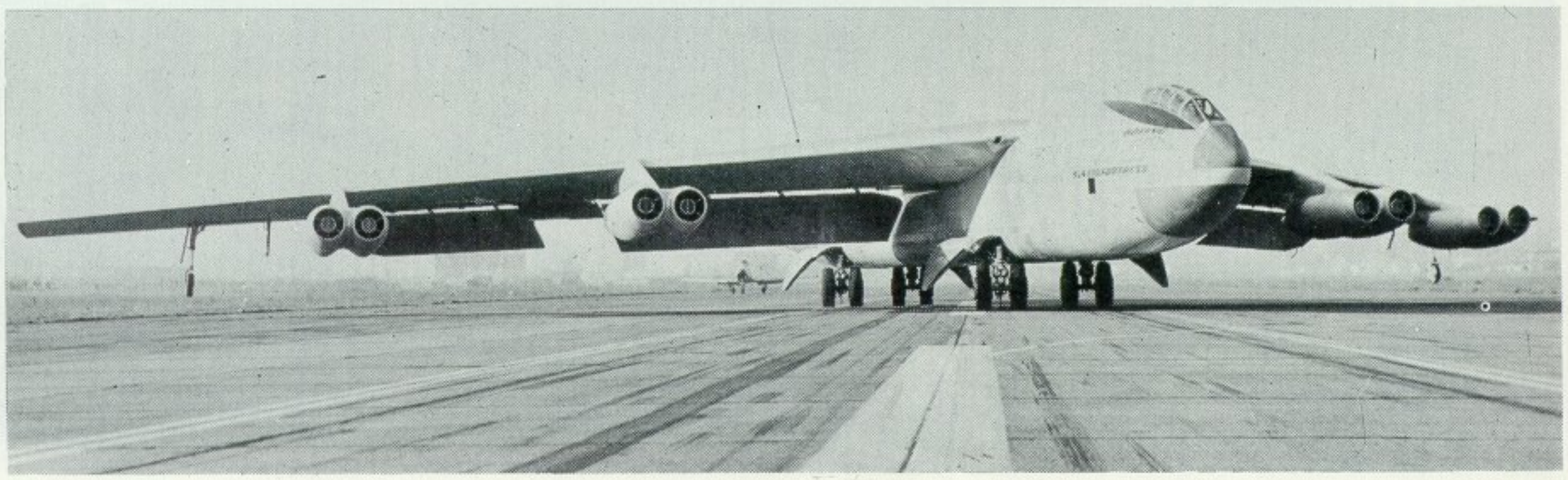
B-52 PRODUCTION

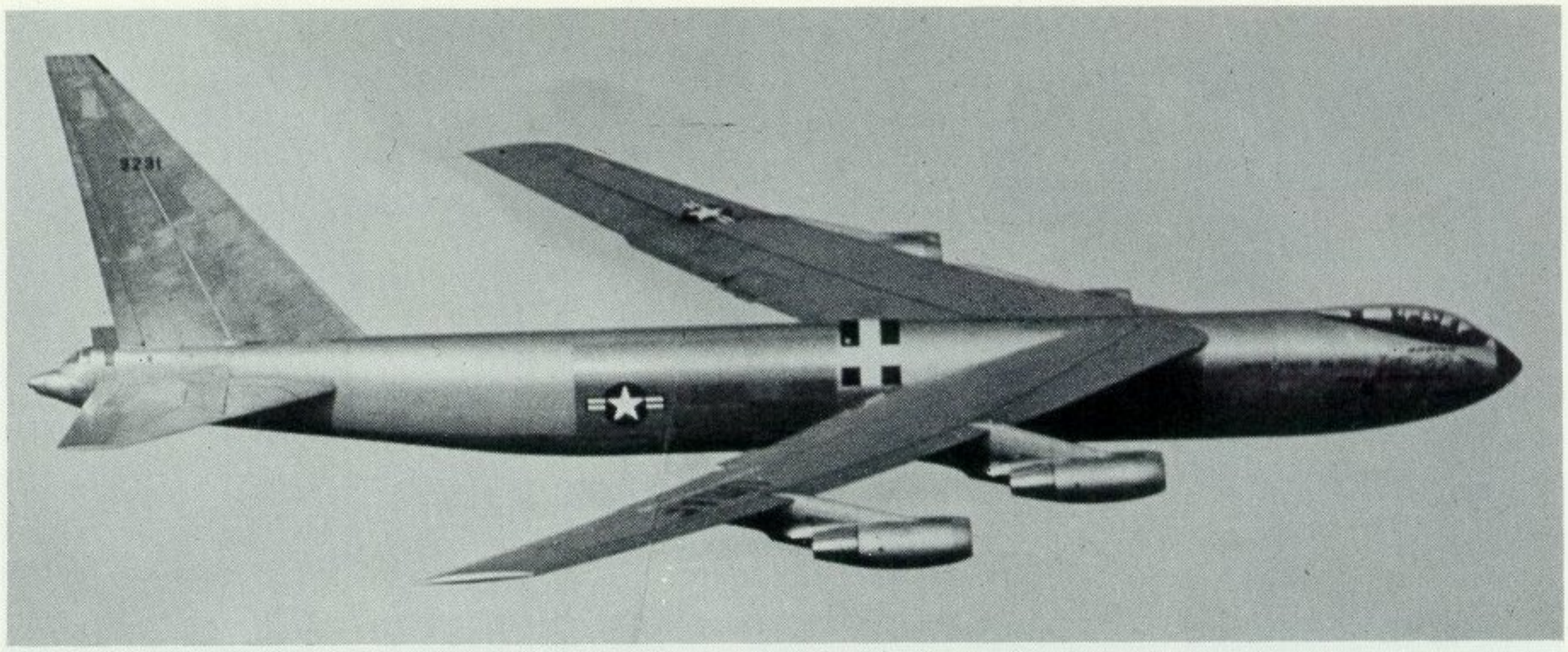
Subsequent wind tunnel model tests and exhaustive engineering studies brought the XB-52 configuration up to Boeing Model 464-67 standard for actual construction. Such was the confidence inspired by the design that the Air Force decided to order production quantities before the prototype flew. In consequence, Air Force letters-of-intent were issued to Boeing to authorize purchase of production tooling in advance of a formal contract.

Further orders followed. Since the quantities involved, taxed the capacity of the main Boeing plant in Seattle – where over 6,000 B-17s (*Profile Nos. 77:* B-17E & F and *205:* B-17G) had been built – the Wichita, Kansas, division of the company was designated as a second manufacturing source by the Air Force. In World War Two, the Army Air Forces opted for Wichita as the site of a new inland factory for B-29 manufacture. From the new government-built Plant II, no fewer than 1,644 B-29 Superfortress bombers were delivered. Wichita produc-

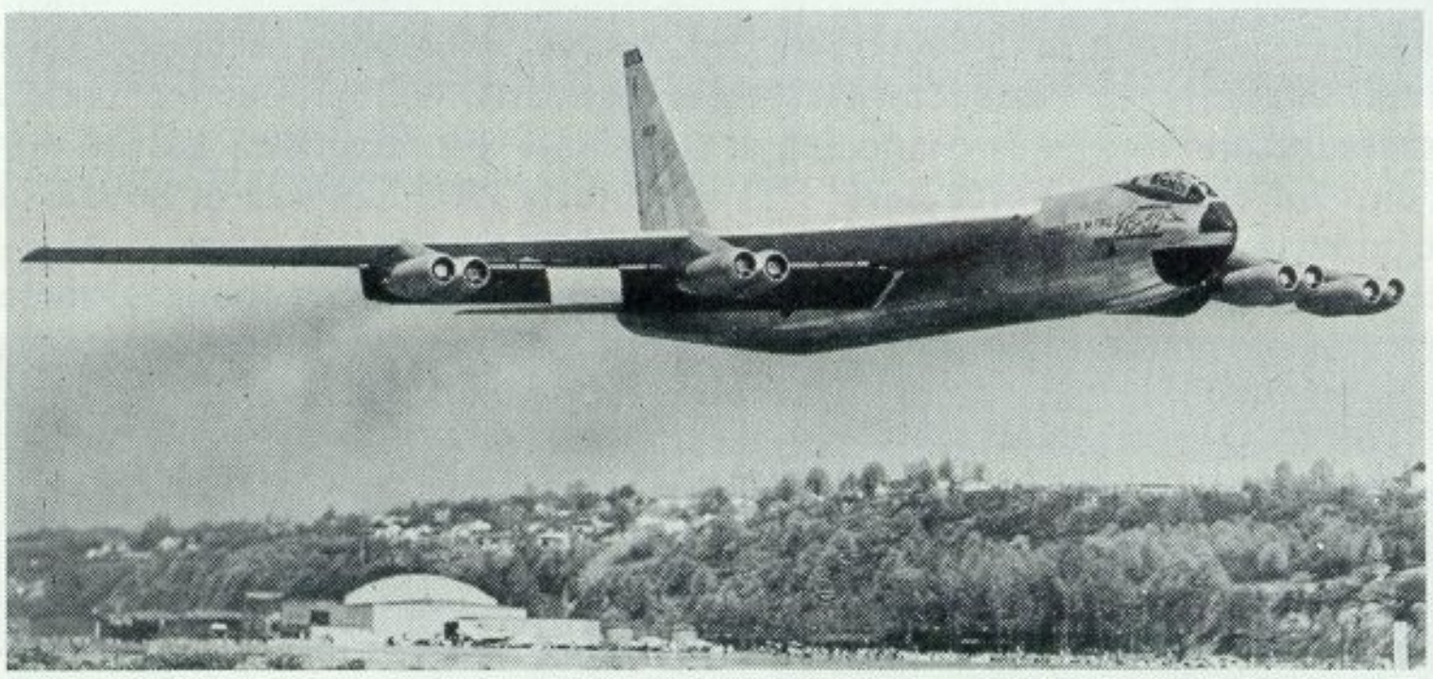
Nose of the XB-52, showing the tandem canopy for the crew and the entry hatch under the belly. The dark areas are moulded non-metallic structures to cover radar equipment. A B-29 Superfortress is jacked-up in the background. (Photo: Boeing)

The XB-52 demonstrates the operation of its cross-wind landing gear; the wheels are aligned with the runway while the bomber is pointed 20 degrees to port. Note that both wingtip protection wheels are off the ground when the B-52 is lightly loaded. Chase observer F-86 Sabre awaits behind the XB-52. (Photo: Boeing)





Early flight test photos of the YB-52 (USAF: 49-231) with no armament installed in the tail turret. The white cross on black square immediately behind the wing is a target for the phototheodolite used to track the experimental bomber during take-off and landing and determine exact lift-off and touchdown points. (Photo: Boeing)



At the time of first flight, April 15, 1952, the four-unit landing gear of the YB-52 was a classified item. At Air Force request, the initially-released photos of the first flight had the landing gear touched out. Unretouched photo released later is shown for comparison. (Photos: Boeing)

The YB-52 deploys the 44-foot braking parachute during a landing. Observe that the prototype has sufficient forward speed here to have lift on the wings, as evidenced by the height of the wingtip protection wheels above the ground.
(Photo: Boeing)

The first production B-52s were the three B-52As, differing outwardly from the prototypes in having a revised nose design for side-by-side crew seating. This is the first B-52A (serial no. 52-1; shown on tail as 2001) on an early test flight. (Photo: Boeing)

tion started with the B-52D model, which together with the B-52E and B-52F models, were produced concurrently in Seattle and Wichita. Seattle production ended with the B-52F while all B-52G and B-52H models were built in Wichita. Engineering responsibility and service support for the entire B-52 programme was then transferred to Wichita to permit Seattle to concentrate on Air Force KC-135 tanker/transports and commercial jet transport work.

Serial Numbers

The point of origin of B-52 manufacture is identified by suffix letters. Thus, a B-52D-BO originated in Seattle while a B-52D-BW stemmed from Wichita. Similarly, B-52s were built under two different manufacturer's serial numbering systems, referred to as c/ns for constructor's numbers hereafter. The Seattle models were serialled under the original Boeing system that numbered all airframes consecutively from the first Boeing aeroplane of 1916. The higher numbers do not reflect the correct total, however, because of the immediate cancellations following the end of World War Two in August 1945. Also, the 1,664 B-29s built in Wichita were allocated Seattle c/ns.

The Wichita plant, on the other hand, was originally that of the Stearman Aircraft Company. This dated from 1927 when a young man, Lloyd Stearman, returned to Wichita to set up the factory adjacent to the Municipal Airport. In the early 1930s, the Wichita plant standardized on a system that serialized aircraft by the total produced of a particular model. The system was retained after Stearman became a Boeing subsidiary in 1934 and a Boeing division in 1939. The one exception to subsequent use of the Stearman c/n, system was the wartime B-29 production. The production B-47s built at Wichita used the Stearman system while the two Seattle-built prototypes used the Seattle system. The Douglas and Lockheed licence-built production models used those manufacturer's own c/ns.

The first Wichita-built Stratofortress was a B-52D, with Air Force serial number 55-49 identifying it as the 49th Air Force aircraft ordered in the fiscal year 1955. It carried the c/n. of 464001, indicating the first Boeing Model 464 built under that system. The last of 467 Wichita-built B-52s carried c/n. 464467. The Seattle B-52 c/ns. started at 16248 for the XB-52 and ended at 17467. The difference is greater than the total of 277 B-52s built in Seattle due to other Boeing models being built in Seattle concurrently.

Test Programme

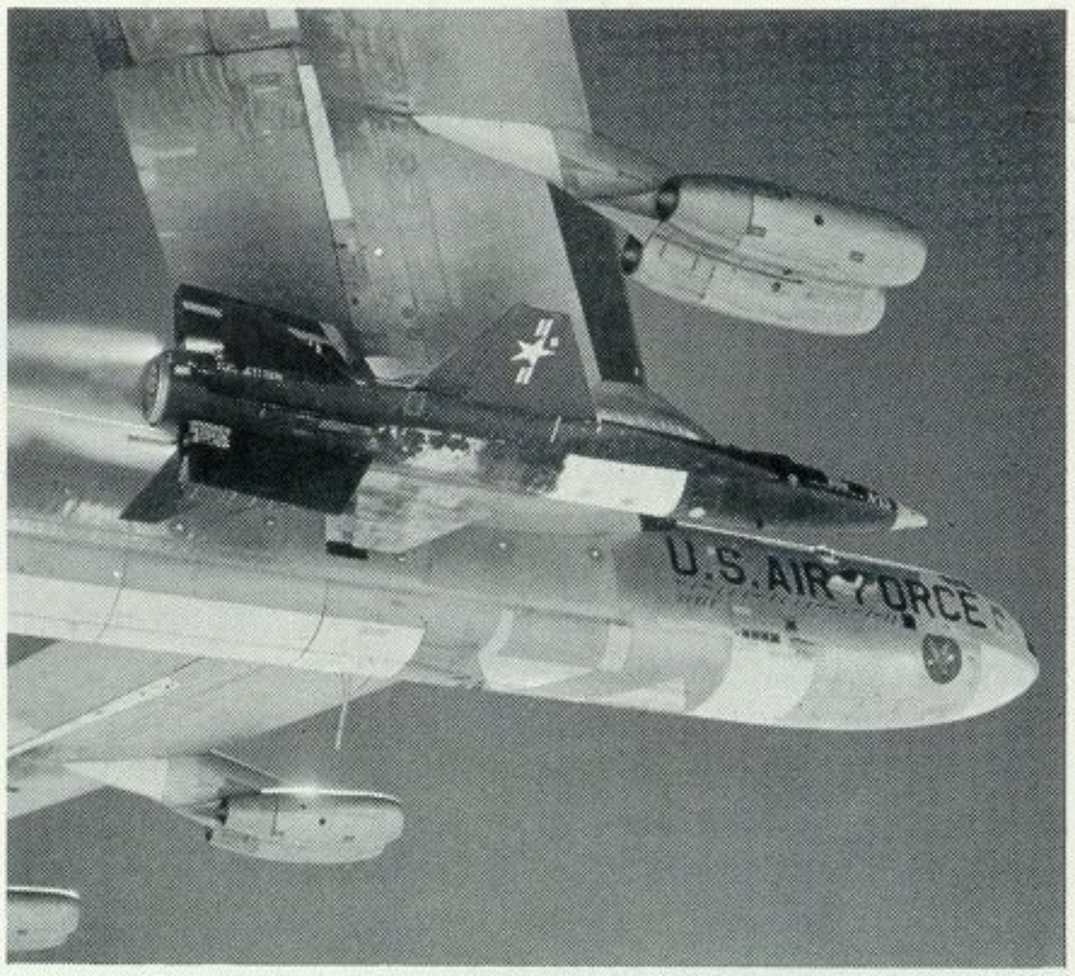
While an extensive experimental flight test programme was undertaken at Seattle to improve the B-52, the shakedown testing of the Seattle-built production models was conducted at a separate test facility on Larson Air Force Base. This was nearly 150 miles east of Seattle in a desert area on the far side of a mountain range.

The production test programme was conducted there as one of the first serious efforts to overcome objections to jet noise adjacent to large metropolitan areas.

B-52 MODEL SEQUENCE

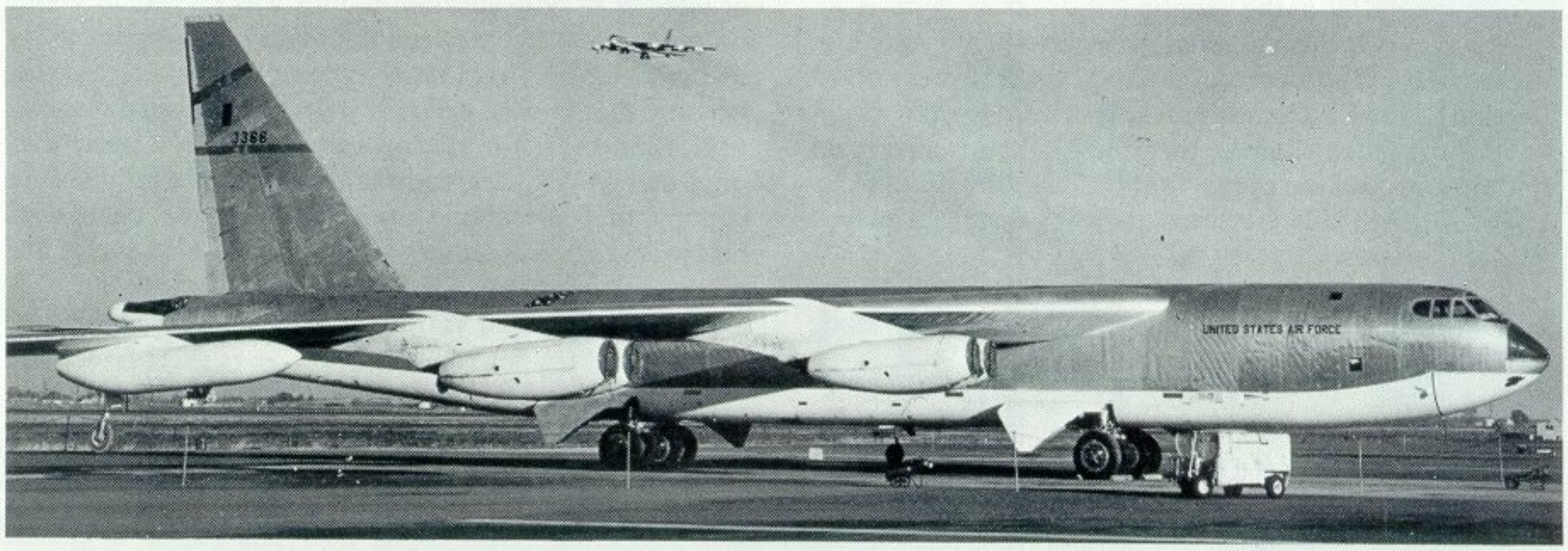
The various models of the B-52, from the prototypes through the final production model, form a rare and perfect example of sequential assignment of series designations to a successive series of the basic model. Few long-production models in Air Force history hold to such a pattern.

The B-52 is also unusual, if not unique, in that in spite of many modifications made subsequent to delivery, there have been no redesignations or new series letters. As an example, the Boeing KC-135, a contemporary of the B-52, was delivered from the factory with designations only as high as KC-135B. There were also some out-of-sequence 135Fs, but that suffix letter was used to identify a model built specifically for France and not a sequential development as A, B, C, and so on. Subsequent modifications to KC-135s have resulted in series letters as high as U and also to changes in the prefix letter for other special-purpose work like VC for Very



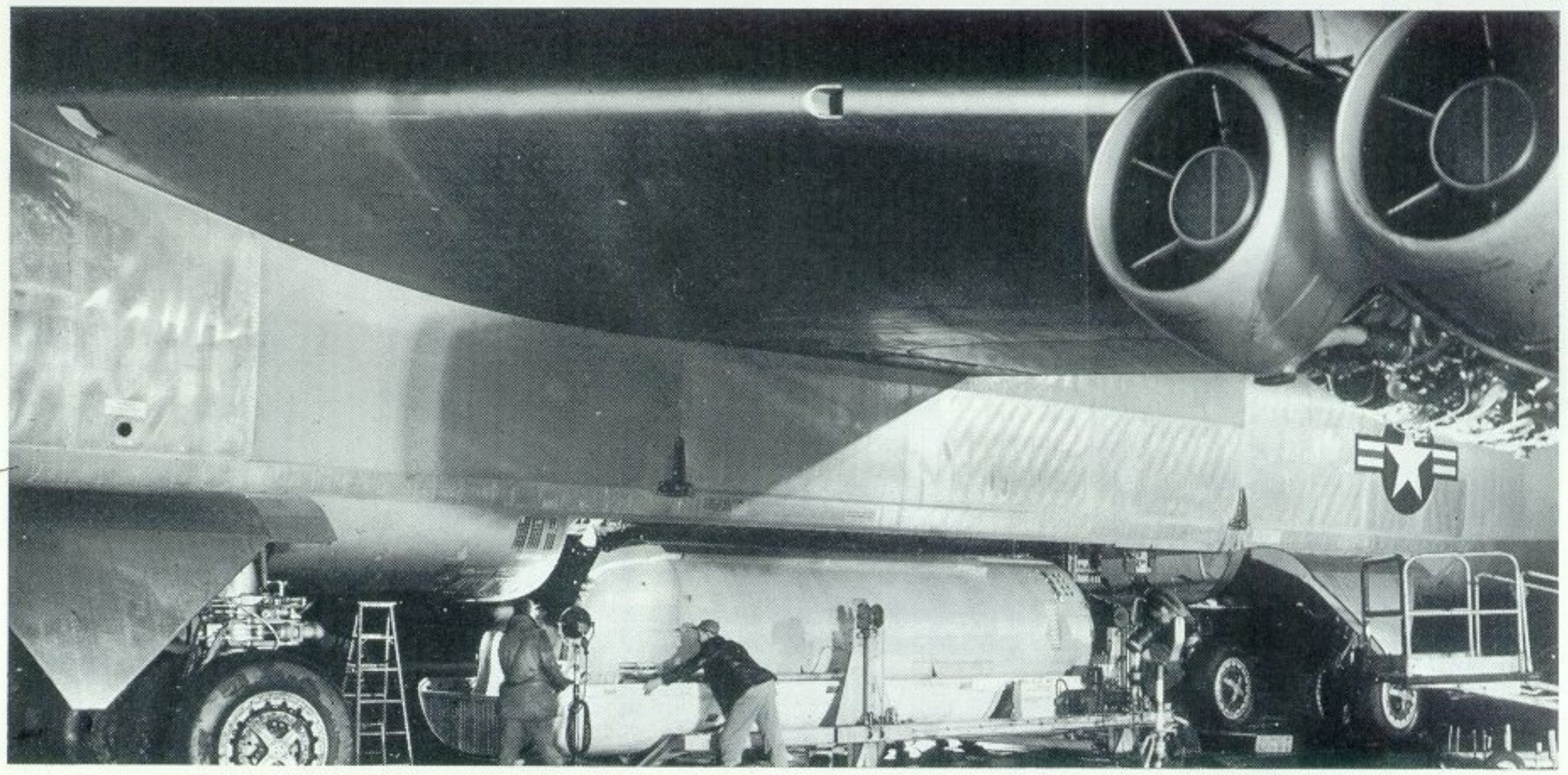
All the B-52As were used for test and development work. After completion of its work at the Boeing plant, the first B-52A was modified in 1959 as a launch vehicle for the rocket-powered research North American X-15 and was redesignated NB-52A. (Photo: USAF)

Outwardly, the B-52B was similar in appearance to the B-52A. This B-52B-35-BO (USAF: 53-394), with SAC emblem, white thermal-reflective paint and the 36-inch high "U.S. Air Force" lettering, is one of three B-52Bs that completed a non-stop flight around the world on January 18, 1957. Other two (here) are 53-397 and -398.
(Photo: Boeing)



An RB-52B at Castle Air Force Base, still with the 12-inch Air Force lettering in use when it was delivered but retrofitted with the white thermal-reflective paint. Here, the star-spangled blue band of Strategic Air Command is carried on the rear fuselage instead of on the nose as in later installations.
(Photo: Boeing)

Distinguishing feature of the RB-52B reconnaissance bomber was the installation of a two-man pressurized capsule in the bomb-bay. This contained cameras and a variety of classified electronic gear. Photo issued in May 1956. (Photo: Boeing)



Important Persons, RC for reconnaissance versions, EC for flying command posts and/or electronic relay stations. The B-52s have always remained bombers and have not been given series letters above B-52H, the last model produced.

Additional prefix letters other than X for Experimental and Y for Service-Test are R (Reconnaissance), applied at the factory, and the N and J prefixes used on special test aircraft diverted from regular service for test and research programmes such as being the parent carrier of aircraft like the North American X-15 rocketplane.

XB-52

Of two flyable B-52 prototypes ordered, only one was delivered as XB-52. This had been refined from the definitive Model 464-49 and emerged as Boeing Model 464-67. Principal differences were a 14-feet increase in length, the use of upper wing surface spoilers and only a tiny aileron located between each pair of wing flaps in place of the conventional ailerons of the -49, and an increase in gross weight to 390,000 pounds. The mainplane aerofoil section is unique, with 19.3% thickness Boeing-designed section at the root (Boeing 237) and progressing through Boeing 248, 251, 250 and 236 to 9.56% Boeing 236 at the wingtip.

Carrying Air Force serial number 49-230 and c/n. 16248, as already observed, the XB-52 generally resembled an enlarged B-47. Common features were the 35° swept wing, the podded engines, the "bicycle" centreline main landing gear and the pilots "bubble" canopy. In practically all other details, however, the two models displayed great differences.

Powerplants were eight Pratt & Whitney YJ57-P-3 axial-flow turbojets delivering 8,700 pounds of static thrust. These were podded in pairs on four underwing pylons similar to B-47 inboard pylons. A unique feature was the use of four turbines in the forward wheel wells which were driven by high-pressure air bled from the second compressor stages of the engines. Their purpose was to operate the B-52's power systems.

Although positioned as on the B-47, the XB-52 landing gear used double units mounted side-by-side. These gave the XB-52 enough ground stability to stand level without the wing-tip-protection wheels touching the ground. However, the mainplane was so flexible that when it contained a full load of fuel, both tips drooped to the point where both tip gear were on the ground to carry the weight. Another unique feature of the main landing gear was that it could be turned 20° to each side to allow the aircraft to crab into strong crosswinds yet land with the wheels parallel to the runway. Braking was assisted by the adoption of a 44-foot diameter ribbon parachute carried in a special compartment in the rear fuselage in the manner of the B-47.

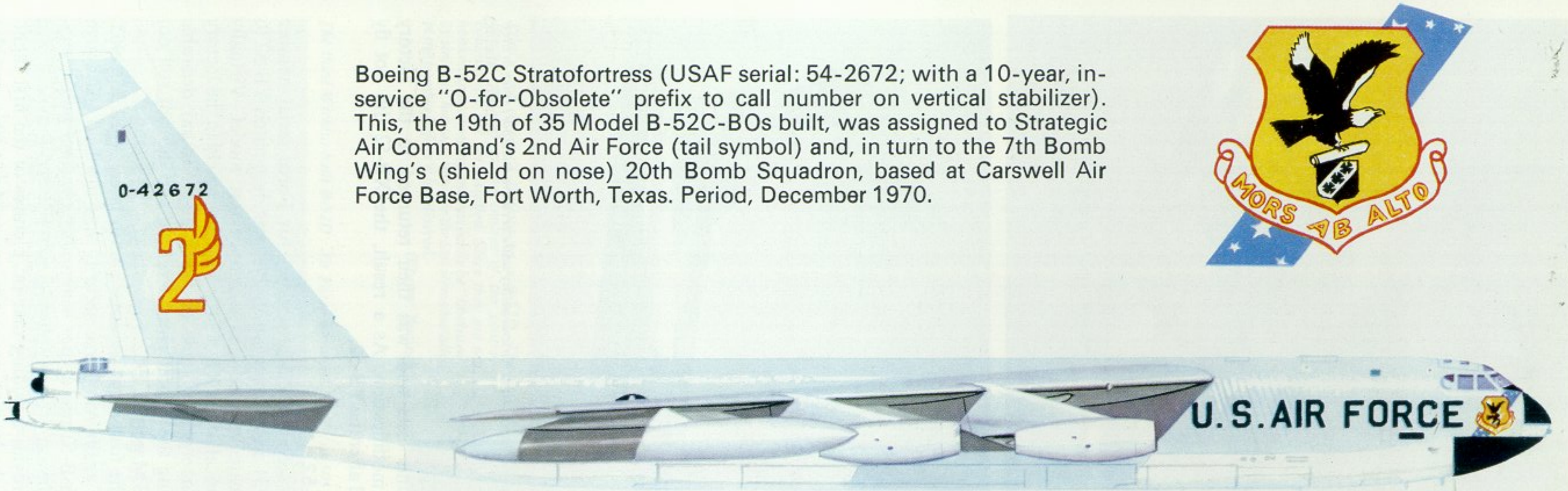
Defensive armament was limited to four 50-calibre (0.50-inch) machine-guns in a manned tail turret. For quick exit in an emergency, this turret could be jettisoned by firing four explosive bolts. The military load of nuclear or conventional bombs was carried in a long bomb-bay located between the main landing gear units. Fuel was carried in bladder-type cells between the wing ribs and the forward and rear spars and in the fuselage.

Normal crew for the prototype was five men, with pilot and co-pilot seated in tandem under a bubble-type canopy in the extreme nose. Others were on a deck below and the tail gunner could go aft to his turret and return only when the XB-52 was unpressurized.

The XB-52 tested various flap-aileron, or "flaperon"

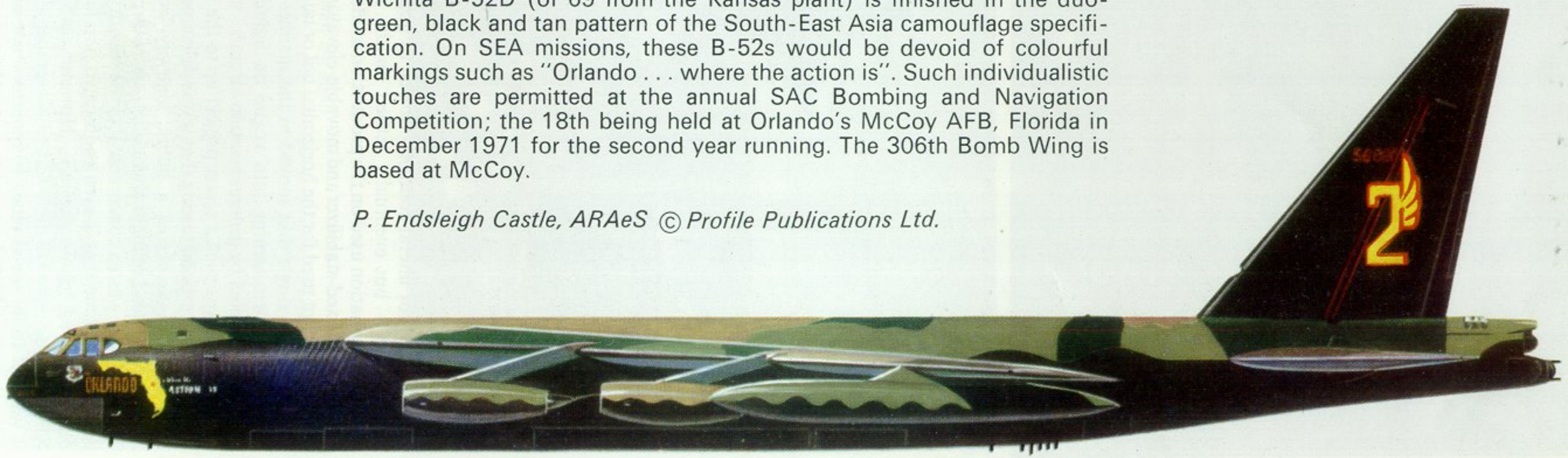
Forward landing gear units of a B-52B revealing that the landing lights are built into the wheel well doors. The lower radome has been removed to show some of the radar installation. (Photo: Boeing)

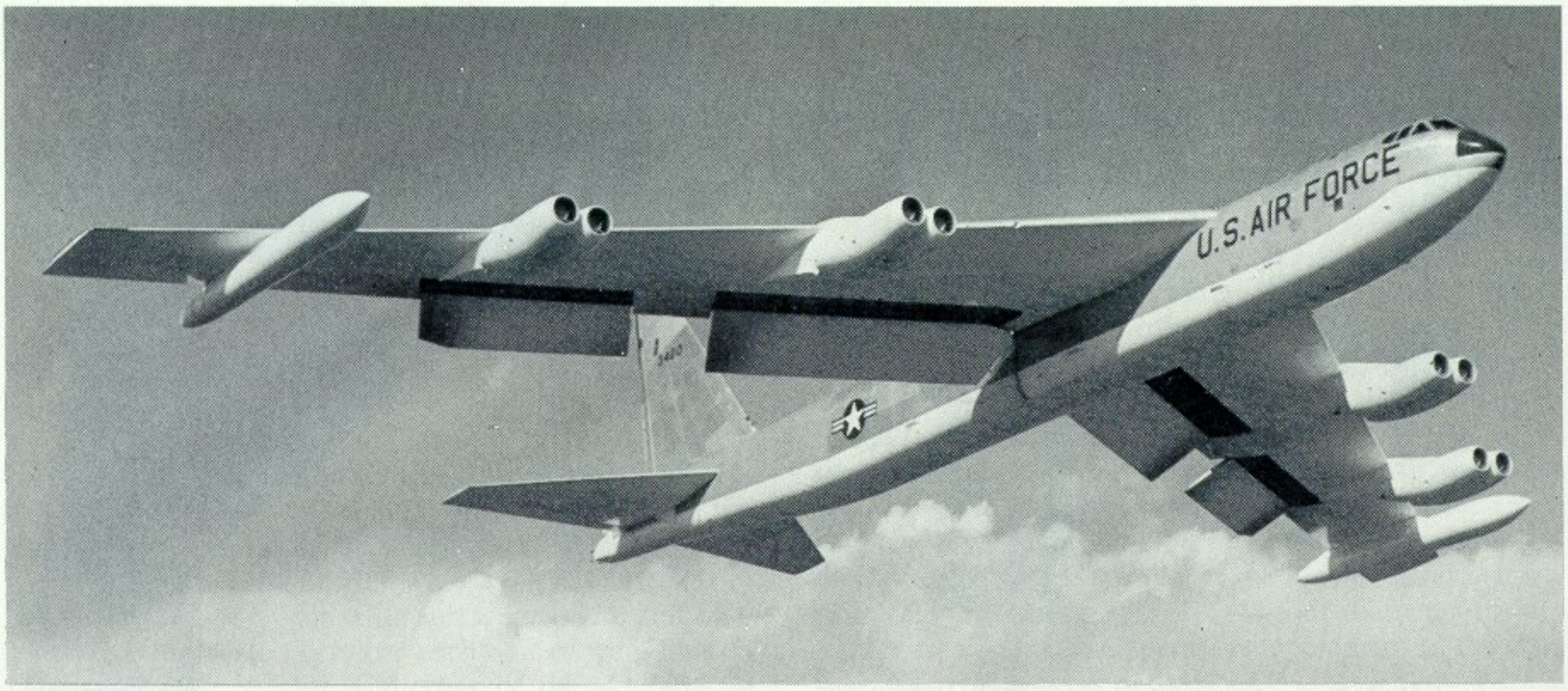
Boeing B-52C Stratofortress (USAF serial: 54-2672; with a 10-year, in-service "O-for-Obsolete" prefix to call number on vertical stabilizer). This, the 19th of 35 Model B-52C-BOs built, was assigned to Strategic Air Command's 2nd Air Force (tail symbol) and, in turn to the 7th Bomb Wing's (shield on nose) 20th Bomb Squadron, based at Carswell Air Force Base, Fort Worth, Texas. Period, December 1970.



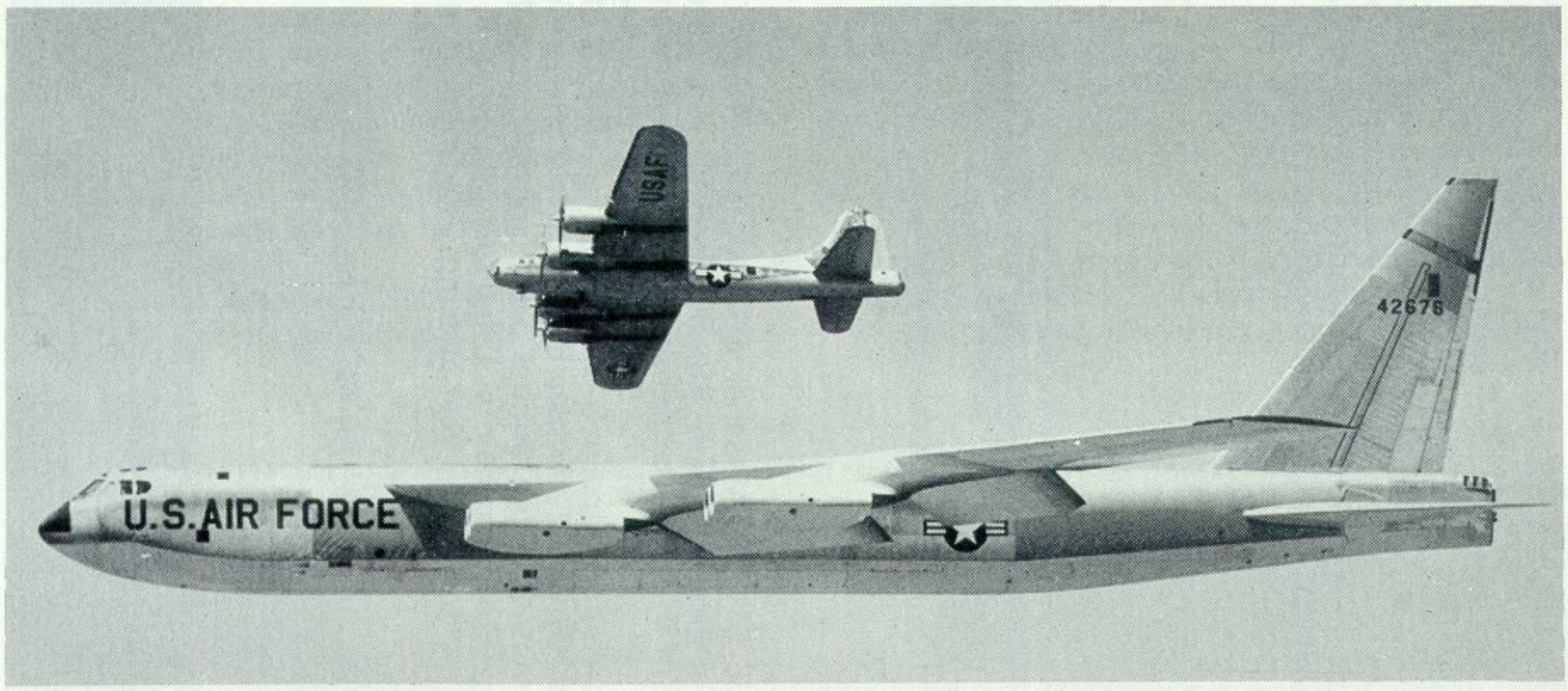
Boeing B-52D-35-BW (USAF serial: 56-680; tail call no. 60680) also of SAC's 2nd Air Force—367th BS, 306th BW. This 28th Boeing-Wichita B-52D (of 69 from the Kansas plant) is finished in the duo-green, black and tan pattern of the South-East Asia camouflage specification. On SEA missions, these B-52s would be devoid of colourful markings such as "Orlando . . . where the action is". Such individualistic touches are permitted at the annual SAC Bombing and Navigation Competition; the 18th being held at Orlando's McCoy AFB, Florida in December 1971 for the second year running. The 306th Bomb Wing is based at McCoy.

P. Endsleigh Castle, ARAeS





Flight view of a B-52C with flaps fully extended. Note that flaps are divided in the area immediately behind the inboard engines. Drop tanks are 3000-gallon (U.S.) capacity. (Photo: Boeing)



A B-52C is accompanied by one of the USAF's last B-17 Fortresses for comparative purposes. Used in various utility and executive transport roles in their final years, the last USAF B-17s were expended in 1960 as radio-controlled targets. (Photo: Boeing)

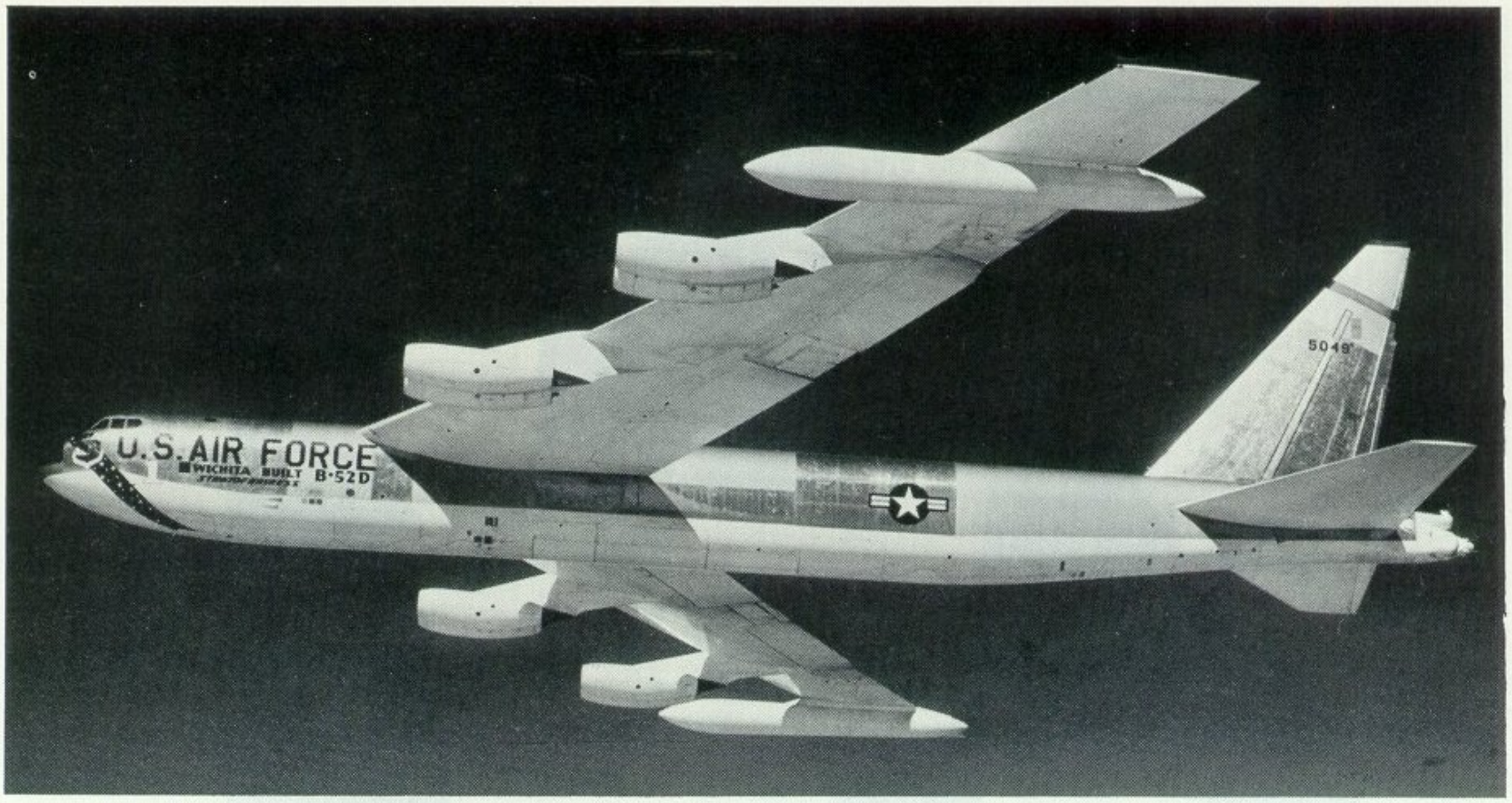
arrangements for lateral control – as well as upper-surface spoilers – but eventually settled on the spoiler-aileron combination used on the production models. The conventional fixed-stabilizer and movable-elevators combination was not used for the horizontal tail or tailplane; rather, a huge single unit moved in the manner of the "stabilator" then coming into vogue on fighters and later to be adopted by general aviation aircraft.

The XB-52 was such a secret project up to the time of its preliminary ground testing that it was delivered to the flight test hangar across a public highway from the factory in the dead of night and hidden under tarpaulins. The Air Force was so concerned with the security of the design at the time that it even confiscated film taken by official Boeing photographers. However, while the XB-52 was delivered to flight test on November 29, 1951, it was not to fly for another 10 months – not until the following October 2. It was given extensive systems and ground tests and was then returned to the factory for modification. As a result, the XB-52 did not fly until after the YB-52.

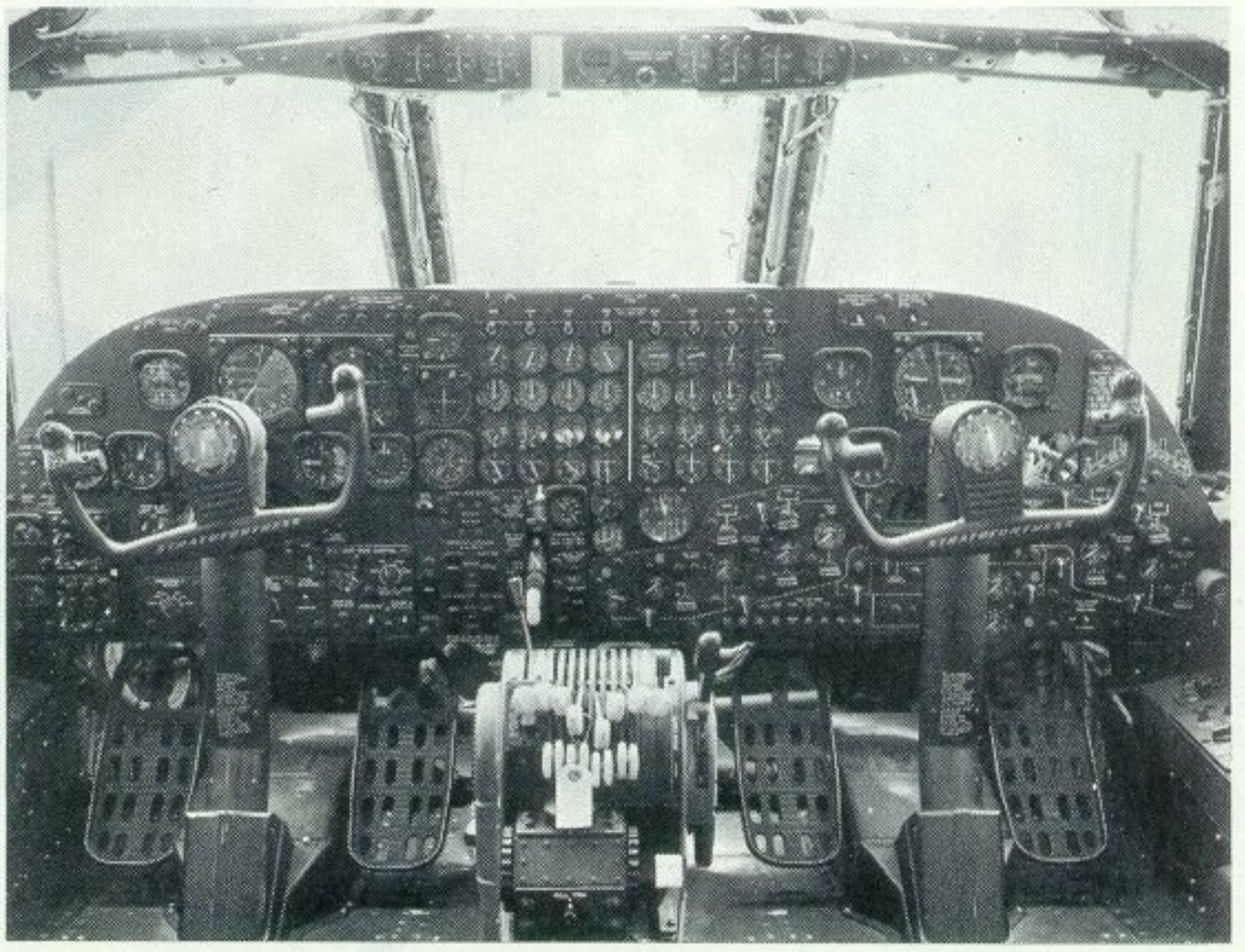
YB-52

The second B-52 prototype, Air Force serial number 49-231 and Boeing c/n. 16249, was designated YB-52 to indicate its status as a service test model. Virtually identical to the XB-52, the YB-52 was held in the factory to incorporate some of the changes found desirable during the XB-52 ground testing and did not roll out until March 15, 1952.

The first flight was one month later, April 15, 1952, and again Air Force security was involved. Although both B-52 prototypes were under constant public view on the airport, early photographs released with Air Force approval, including take-off pictures of the first flight, had the landing gear units censored out (this was also

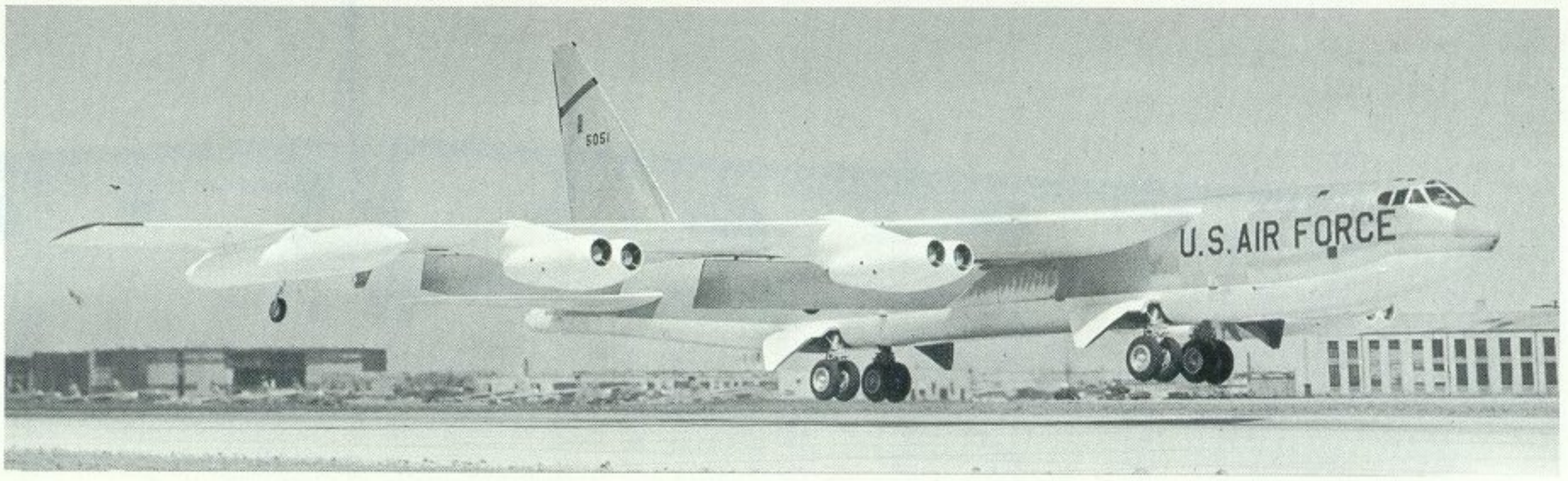


The first (USAF: 55-049) of 170 B-52Ds was built in Wichita, and carried suitable lettering on the nose to publicize the fact. Extension of the blue nose band of the Strategic Air Command into the white-painted area was a non-standard application. (Photo: Boeing)



Pilot's and co-pilot's stations on a B-52D. The Boeing emblems in the centres of the control-columns are not yet installed. Since they are not hooked up to anything and can easily be "liberated" by souvenir hunters, they are the last items installed in the bomber before it is delivered.
(Photo: Boeing)

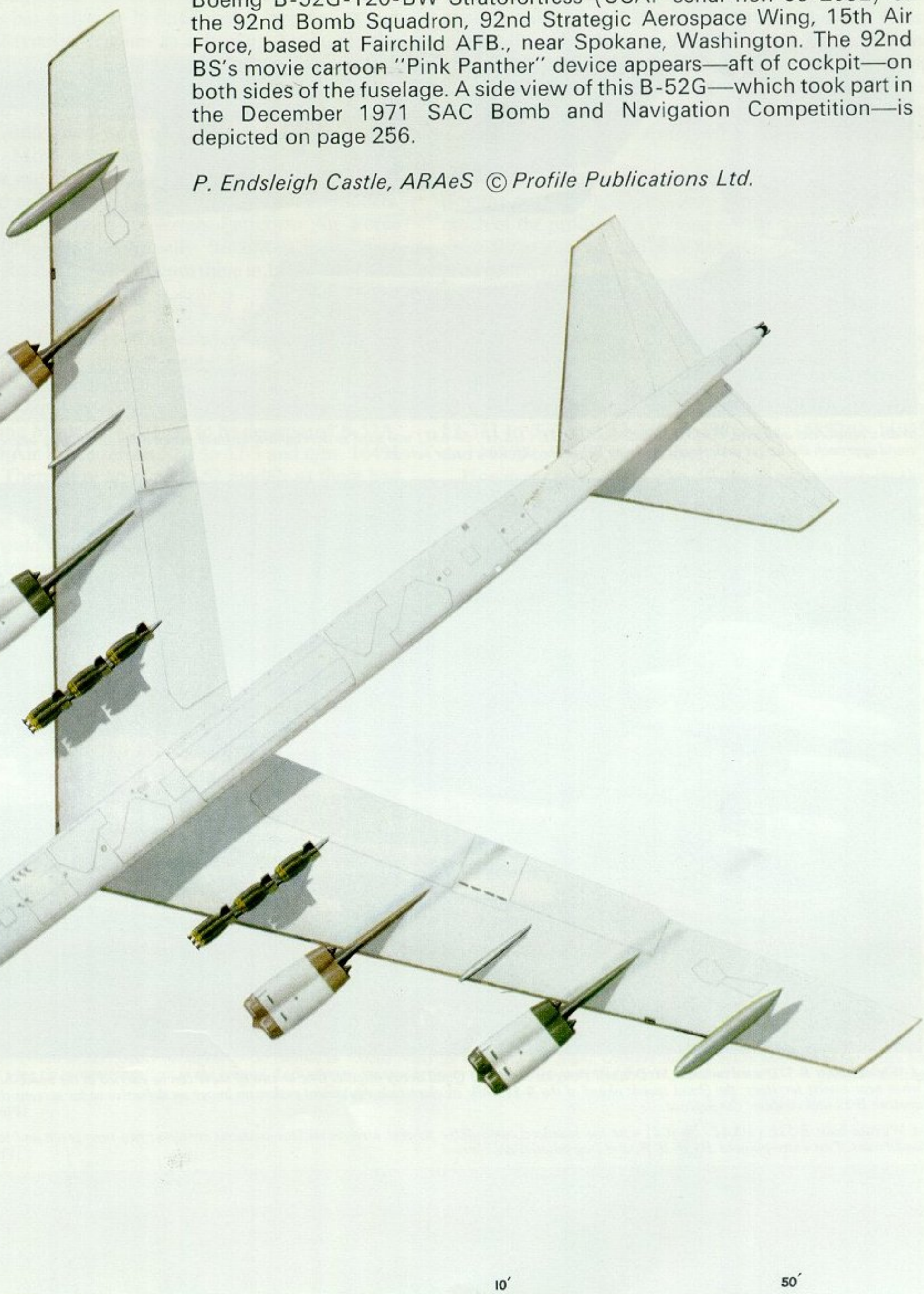
The third Wichita-built B-52D , Air Force serial no. 55-51 (as 5051), landing after an early test flight. (Photo: Boeing)

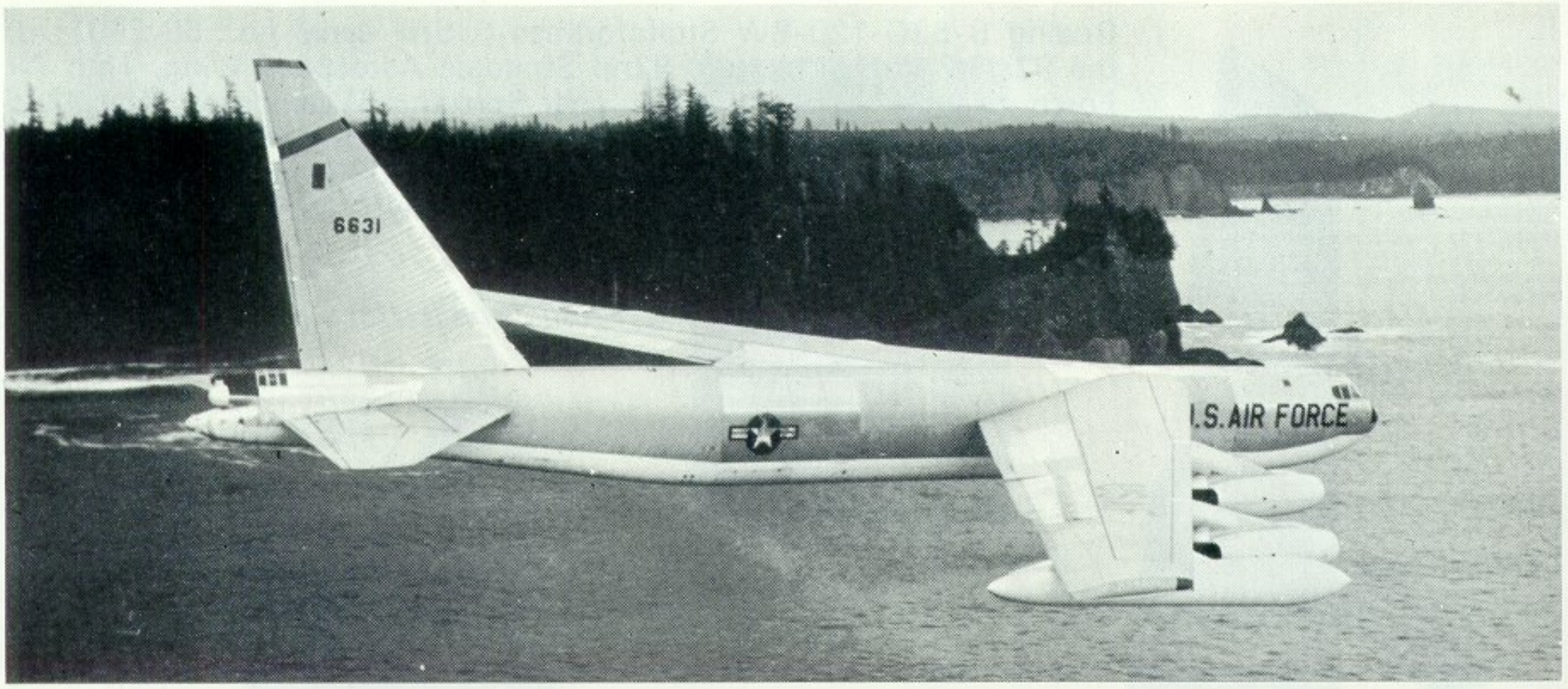



Spokane
Washington
USAF

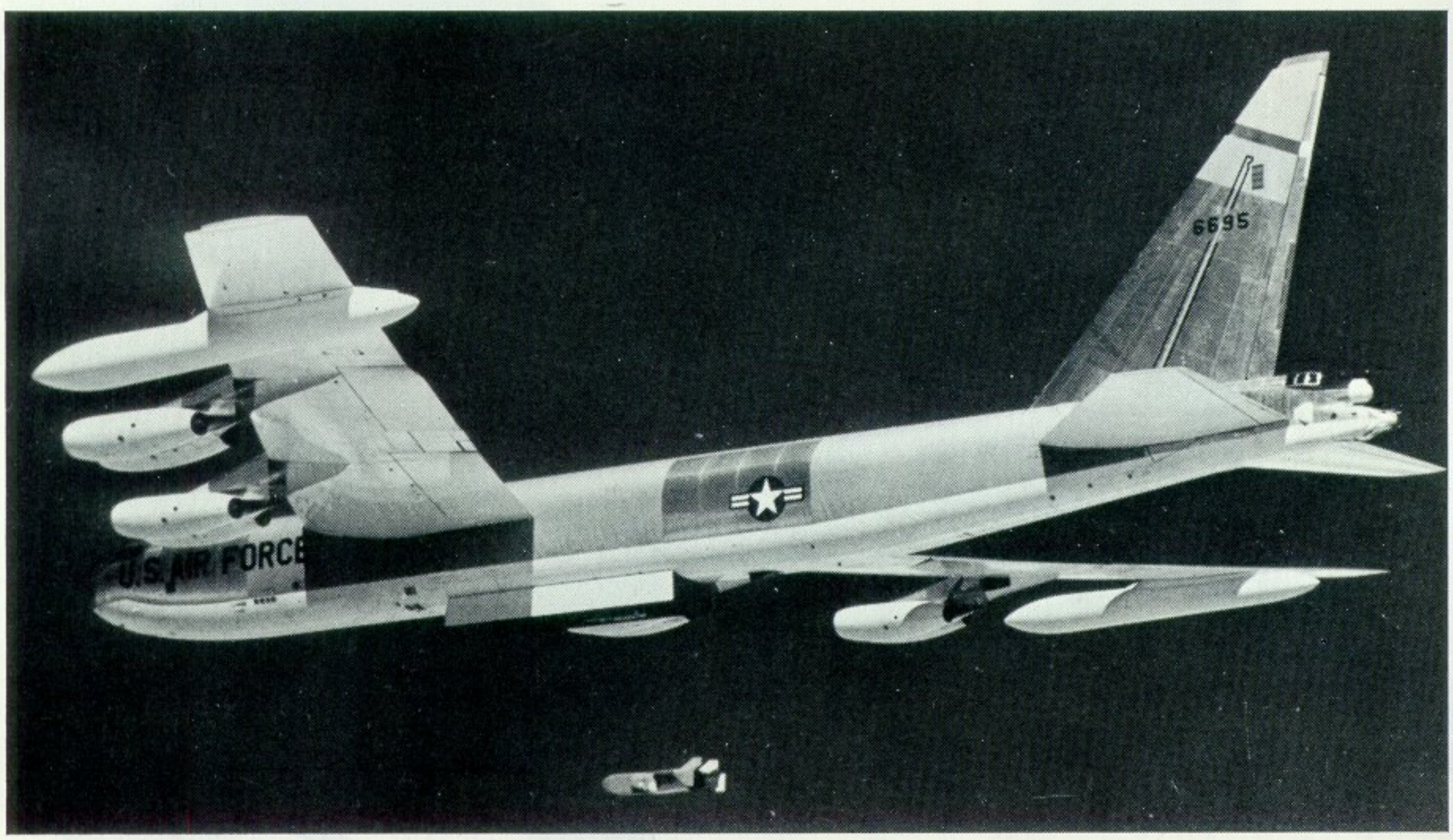
Boeing B-52G-120-BW Stratofortress (USAF serial no.: 59-2592) of the 92nd Bomb Squadron, 92nd Strategic Aerospace Wing, 15th Air Force, based at Fairchild AFB., near Spokane, Washington. The 92nd BS's movie cartoon "Pink Panther" device appears—aft of cockpit—on both sides of the fuselage. A side view of this B-52G—which took part in the December 1971 SAC Bomb and Navigation Competition—is depicted on page 256.

P. Endsleigh Castle, ARAeS





With a reinforced airframe, the first Seattle-built B-52E (USAF: 56-631) was used to develop low-altitude penetration techniques whereby the bomber could approach the target undetected by flying below the defensive radar screen. (Photo: Boeing)



A Wichita-built B-52D used to test a McDonnell Douglas ADM-20 Quail decoy missile. One or two of these can be carried in the bomb-bay. Launched when near enemy territory, the Quail speeds ahead of the B-52 while its electronic equipment makes an image on defensive radar screens that looks like another B-52 and confuses the defense. (Photo: Boeing)

A Wichita-built B-52E (USAF: 56-701) with the standard camouflage scheme used on nuclear-weapons carriers; two-tone green and tan, with white undersides. Two white-painted AGM-28 Hound Dog missiles are carried. (Photo: author)

done on photos of the contemporary Convair YB-60, which was basically a B-36 fitted with a swept wing and eight B-52-type jet engines as a backup design for the B-52).

Following delivery to the Air Force, both the XB-52 and YB-52 were turned back to Boeing on bailment contracts and used for test and development programmes. Most notable change to the YB-52 in its later years was the use of the shorter vertical tail eventually used on the B-52G and B-52H production models. The YB-52 was flown to Wright-Patterson Air Force Base in Ohio, and eventually became a permanent display at the Air Force Museum there in 1958.

B-52A

Even before the B-52 prototypes were first flown, the Air Force decided that the new model should be produced and authorized funds for production tooling in advance of actual production contracts. The initial order was for three Boeing Model 464-201-0s, to be designated B-52A. These had Air Force serials 52-1 to 52-3 and c/ns. 16491 to 16493. There were no plain B-52 models as there had been B-29s; early post-war policy decreed that the first production model – barring prototypes going to higher letters – would have the series suffix letter A.

The major outward difference between the production B-52A and the prototypes was a change in the nearly 4-feet lengthened nose contour with the deletion of the "bubble" canopy. Henceforward the pilots were seated side-by-side instead of in tandem. Crew accommodation was increased to six. While the three B-52As were not fitted with bombing-navigation systems, they did carry Type A-3A fire-control systems.

Powerplants were the J57-P-9W turbojets with water injection. While the B-52As were equipped to use the new Boeing-developed "Flying Boom" system of aerial refuelling, unrefuelled range was increased by the addition of two 1,000-U.S. gallon drop tanks under the wings to supplement the normal 36,000-gallon internal tankage. Gross weight remained 390,000 pounds and speed was 490 knots (564 m.p.h.) at 46,700 feet.

The first B-52A rolled out of the factory with appropriate ceremony on March 18, 1954, and made its first flight on August 5. After company test flights, all three were turned over to the Air Force, which immediately turned them back to Boeing on bailment contract for continuation of the development programme. When eventually redelivered to the Air Force, all three were used for continuing test work and never served with squadrons. The most famous use of the B-52A was under the designation of NB-52A when used as for the airborne launch of the North American X-15 rocket-powered research aircraft.

The unit costs of the three B-52As was a staggering (for the time) $29,383,466, but it must be realized that much of the production tooling cost was charged against these three aircraft and was not amortized over a long production run.

B-52B

Of 50 B-52B models delivered, the first 10 were originally to have been B-52As but were modified to the standards of the later B-52B, Boeing Model 464-201-3, and were completed as B-52Bs. These were allocated USAF serials 53-373 to 376 and 53-380 to 398; c/ns. 16852 to 16855 and 16859 to 16877, respectively.

However, only 23 of the 50 were completed in the original bomber configuration; the remainder were equipped with an alternate reconnaissance capability and were delivered as RB-52Bs. Principal difference from the B-52A was the use of later J57-P-19W, -29W, and -29WA water-injection powerplants. Gross weight increased to a maximum of 450,000 pounds. Some B-52Bs used the A-3A fire-control system and others employed the MD-5 system; all used the MA-6A bombing-navigation system.

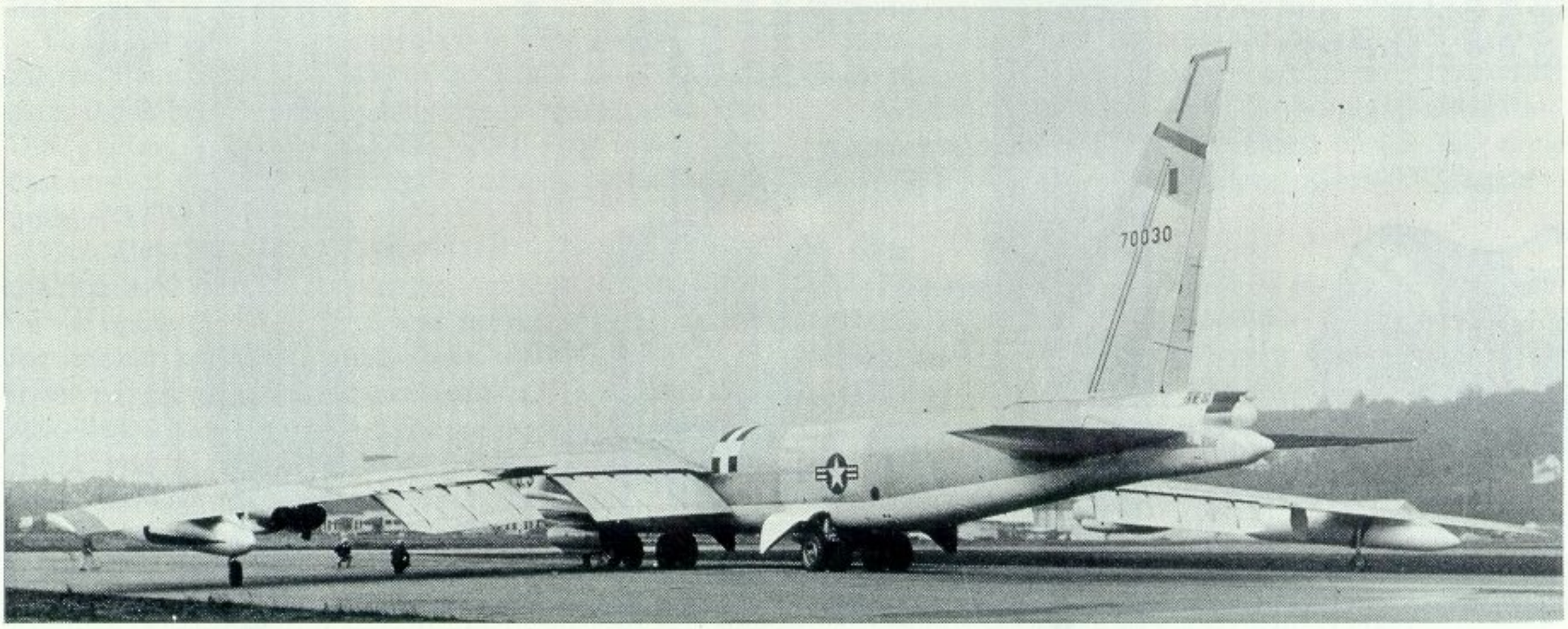
First flight of the B-52B was on January 25, 1955, and the first delivery to an Air Force unit was to the 93rd Bomb Wing of the Strategic Air Command at Castle Air Force Base, near Merced, California, on June 29, 1955.

On January 18, 1957, three B-52Bs from Castle AFB completed a non-stop flight around the world. Elapsed time was 45 hours 19 minutes for the 24,325 miles at an average speed of 452 knots (520 m.p.h.).

RB-52B

The 27 RB-52Bs possessed a unique feature. This was a two-man pressurized capsule which could be carried in the bomb-bay. It could be equipped with cameras for photographic reconnaissance or with various electronic

The first Seattle-built B-52F, USAF serial no. 57-30 (shown as 70030) ready for a factory test flight. Observe that the heavy fuel load in the wings has pressed both wing tip protective rollers to the ground. Left aileron, located between the two fully-extended flowler flaps, is raised. (Photo: Boeing)



Boeing B-52H-BW Stratofortress (USAF serial: 60-61; with a 10-year, in-service "0" prefix to call no. 0-00061 on the vertical stabilizer). Normally based at Wurtsmith AFB, Oscoda, Lake Huron, Mich., this B-52H is assigned to SAC's 2nd Air Force—524th Bomb Squadron, 379th Bomb Wing. With the artistic and heraldic marks depicted, including Mr Bunyan and the SAC shield under the pilot's cockpit, "0-00061" (the 61st H model constructed) took part in the December 1971 Command Bombing and Navigation Competition, McCoy AFB., Florida.

Boeing B-52G-120-BW (USAF serial: 59-2592) bearing the outlines of that elegant cartoon feline, "The Pink Panther"; in this case a more lavender-hued version chosen by the 92nd Bomb Squadron of the 92nd Strategic Aerospace Wing, 15th Air Force, Fairchild AFB., Wash. All the crew members' names are inscribed on each side of the panther symbol. Note: Other views of this aircraft appear on pages 252-253. The mainplane is shown in an optimum (non-flexed) position with sufficient fuel expended to permit normal landing.

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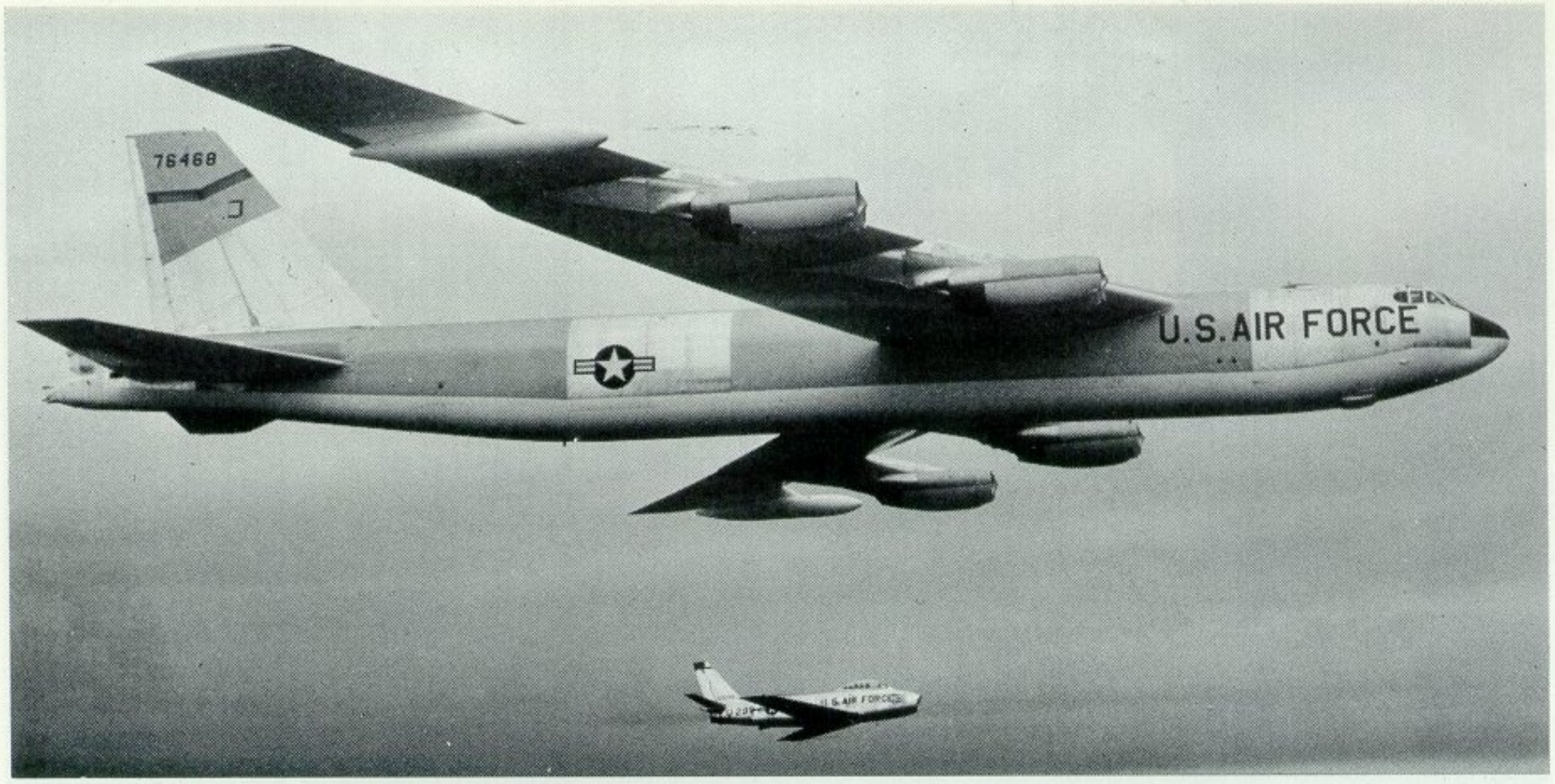


The first B-52G (USAF: 57-6468) on an early test flight accompanied by a "chase" F-86 Sabre. Principal external identifying feature is the shortened vertical tail. Seattle B-52 production ended with the B-52E; all subsequent B-52 models were built only at Wichita. (Photo: Boeing)

devices for detection and ECM countermeasures.

The USAF serials for the 27 RB-52Bs were: 52-5 to 13 (Boeing c/ns. 16434 to 16503 range); 52-8710 to 8716 (c/ns. 16838 to 16844); 53-366 to 372 (c/ns. 16845 to 16851) and 52-377 to 379 (c/ns. 16856 to 16858).

The unit price of B-52Bs and RB-52Bs dropped to $14,430,872, or roughly half that of a B-52A. Two RB-52Bs (52-7 and 52-9) were redesignated JB-52Bs when used as carriers for the X-15 at Edwards (formerly Muroc) Air Force Base, headquarters of the Air Force Flight Test Center.

Other B-52Bs and RB-52Bs were modified to B-52C standard in 1957 and 1958. The last examples were retired and placed in extended storage at Davis-Monthan AFB, near Tucson, Arizona, on June 29, 1966.

B-52C

The 35 B-52Cs carried the Boeing Model number of 464-201-6 and USAF serials 53-399 to 408 and 54-2664 to 2688. The Boeing c/ns. were, respectively 16878 to 16887 and 17159 to 17183.

These were essentially improved B-52Bs and retained the reconnaissance capability of the RB-52B but did not carry the R-prefix. Fuel capacity was increased to 41,700 U.S. gallons by the use of 3,000-gallon drop tanks. The unit cost of the B-52C was again reduced by half; to a price of $7,247,963 each.

First flight of the B-52C was March 9, 1956. This was the first B-52 to carry the thermal-reflecting white paint on the under-surfaces which was just coming into vogue for nuclear-weapon carriers. Once again, security was involved; the purpose and composition of the paint was classified. This posed a problem for Boeing as a painted B-52C was to participate in dedication of the new test centre at Larson Air Force Base across the Cascade Mountains from Seattle. It was decided to ignore the presence of the new paint scheme completely with the ironic result that its appearance was never questioned.

B-52D

When it became evident that the B-52 was to become the principal heavy bomber of the Strategic Air Command, the Air Force designated the Boeing Wichita plant as the second production source. Of 170 B-52Ds built, 69 were from Wichita. Designated Boeing Model 464-201-7, the 101 Seattle-constructed B-52Ds had USAF serials 55-68 to 117 and 56-580 to 656 (with Seattle-type c/ns. 17184 to 17233 and 17263 to 17313). The 69 Wichita-produced models has USAF serials 55-49 to 67, 55-673 to 680, and 56-656-657 to 698 (but carried the old "Stearman" type c/ns. 464001 to 464069). The Seattle construction numbers were not consecutive because of concurrent production of the KC-135A tanker-transports.

The Wichita-built B-52D flew first. Roll-out was on December 7, 1955 and first flight was May 14, 1956; with delivery to Castle Air Force Base on June 14. The first Seattle-built B-52D flew on September 28, 1956.

The B-52Ds were essentially B-52Cs without the reconnaissance capability; powerplants were the J57-P-19W or -29W and the gross weight and fuel capacity were the same. The fire-control system could be either the A-3A or the MD-9 while the bombing-navigation system was still the MA6A. The cost of a B-52D came down by a further $\frac{3}{4}$-million dollars to $6,580,872 each.

B-52E

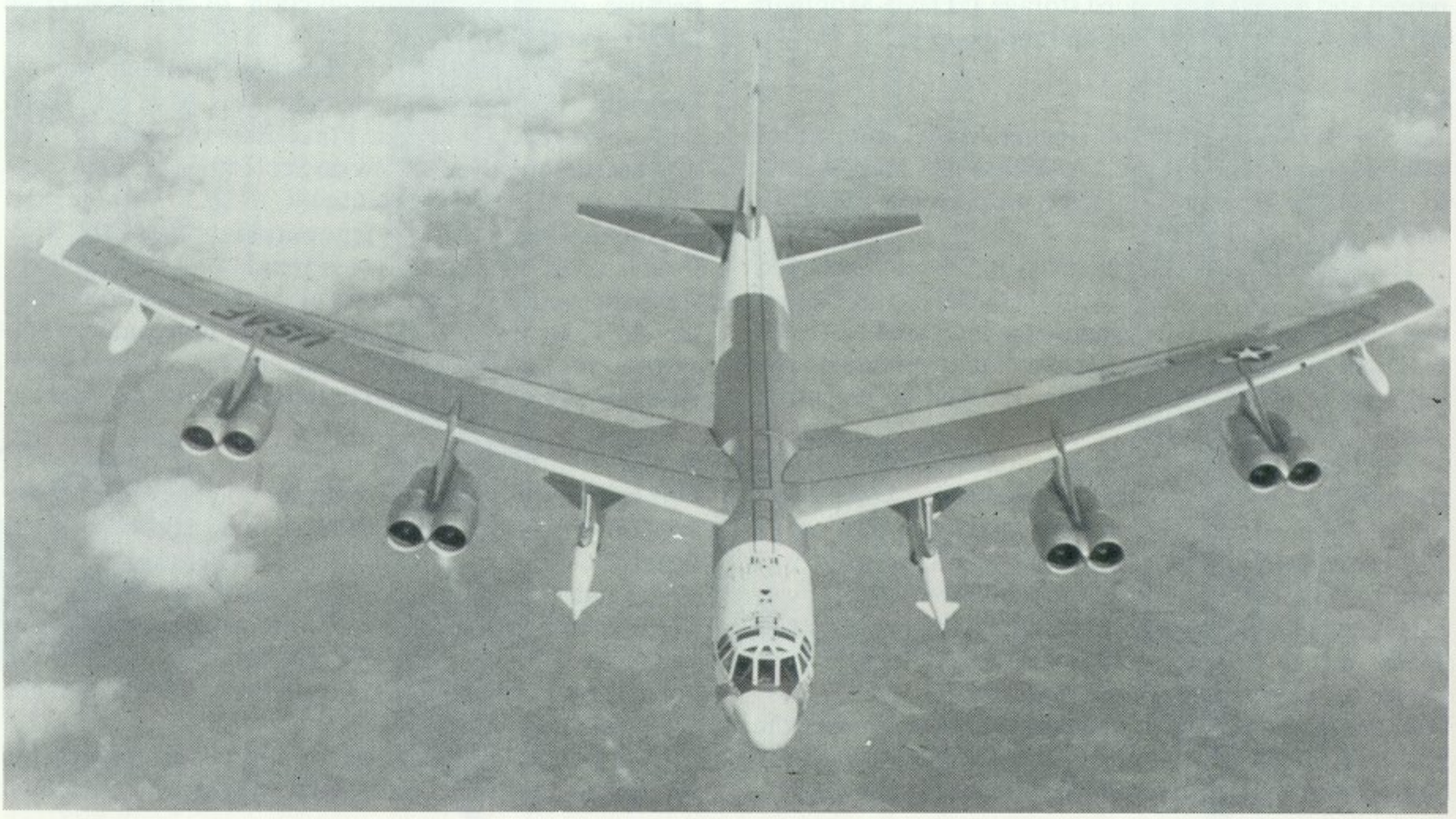
One hundred B-52Es were built by Boeing as the Model 464-259. Forty-two were produced in Seattle with USAF serials 56-631 to 656 and 57-14 to 29 (c/ns. 17314 to 17339 and 17408 to 17423). The remaining 58 came from Wichita with USAF serials 56-699 to 712 and 57-95 to 138 (c/ns. 464070 to 464127). The first B-52E flight was at Seattle on October 3, 1957, with the first Wichita flight two weeks later on October 17.

The B-52Es were similar to the B-52D except for improvements in the bombing-navigation and electronic

A B-52G with 700-gallon (U.S.) drop tanks being used by the Air Force to test electronic countermeasures pods that can be seen under the wings between the inboard and outboard nacelles. Note the double theodolite target markings fore and aft on the fuselage. (Photo: USAF via Boeing)

A B-52G (USAF: 58-159 as 80159 on the fin) takes-off with two AGM-28 Hound Dog missiles. At this stage the wingtip protection gear has completely retracted and the main landing gear is just starting up. Blue band of the Strategic Air Command carried on the nose, but no emblem
(Photo: Boeing)

With the same shortened vertical tail of the B-52G, the B-52H was similar in appearance except for the larger inlets of the more powerful P&W TF33 fanjet engines. The white-appearing nose and tail sections here are actually light red "Day Glo" high-visibility markings on a test aircraft. Hound Dog missiles are in evidence. (Photo: Boeing)



systems. Production experience brought the cost down to $5,948,490 – the lowest of any B-52.

Early B-52Es were used as carriers for the Pratt & Whitney J52-powered North American Rockwell AGM-28 (ex-GAM-77) Hound Dog inertial-guidance, air-to-ground, thermonuclear missile. Likewise, B-52Es were employed to test new low-altitude operational techniques designed to fly under potential enemy defence radar screens.

B-52F

The B-52F – Boeing Model 464-260 – was the last B-52 model built in Seattle. Forty-four were produced there with USAF serials 57-30 to 72 (c/ns. 17424 to 17467). Another 45 were delivered from Wichita with USAF serials 57-139 to 183 (c/ns. 464128 to 464172). The first Seattle B-52F flew on May 6, 1958 and the first Wichita model on May 14, 1958.

The major difference between the B-52F and earlier models was deletion of the air-driven turbines and their replacement with so-called "hard drive" alternators, one each attached to the port unit of each pair of J57-P-43W turbojets.

Following delivery of the last Seattle-built B-52F on February 24, 1959, all responsibility for the B-52 design, production, and service support was transferred to Wichita. Unit cost of the B-52F increased slightly to $6,485,404.

B-52G

The B-52G incorporated the first major appearance change in the B-52 since the B-52A nose revision. The Boeing Model 464-253 – which used the shorter vertical tail tested on the YB-52 – was the major production model of the B-52 series. All 193 were built in Wichita; USAF serials 57-6468 to 6520, 58-158 to 258, and 59-2564 to 2602 (c/ns. 464173 to 464365). First rollout was July 23, 1958; and first flight was on October 27. Initial delivery started on November 1, 1958.

Internal changes were extensive – the fuel capacity was increased to 46,000 gallons by the use of additional tanks and elimination of the rubber bladder-type tanks in the wings. The cells between the spars and ribs were made into integral tanks, forming what is known as a "wet wing". Capacity of the drop tanks was reduced to 700 gallons each. Gross take-off weight was increased to 488,000 pounds with allowable (12,000 lb.) taxying weight of 500,000 pounds.

The armament system was revised by deleting the tail gunner's position and moving him to the forward fuselage section, where he could operate the tail guns by the AGS-15 fire-control or remote control monitored by radar or CCTV (closed-circuit television).

The B-52G was the first model produced with facilities for deploying the AGM-28 Hound Dog winged missle that had been tested on an earlier B-52. Incidentally, the B-52G was to have carried the cancelled Douglas GAM-87A Skybolt missile. In addition, the B-52G could carry four McDonnell Douglas ADM-20 (ex-GAM-72) Quail General Electric J85-powered air-to ground decoy missiles in the bomb-bay. Unit cost of the B-52G was $8,040,176.

B-52H

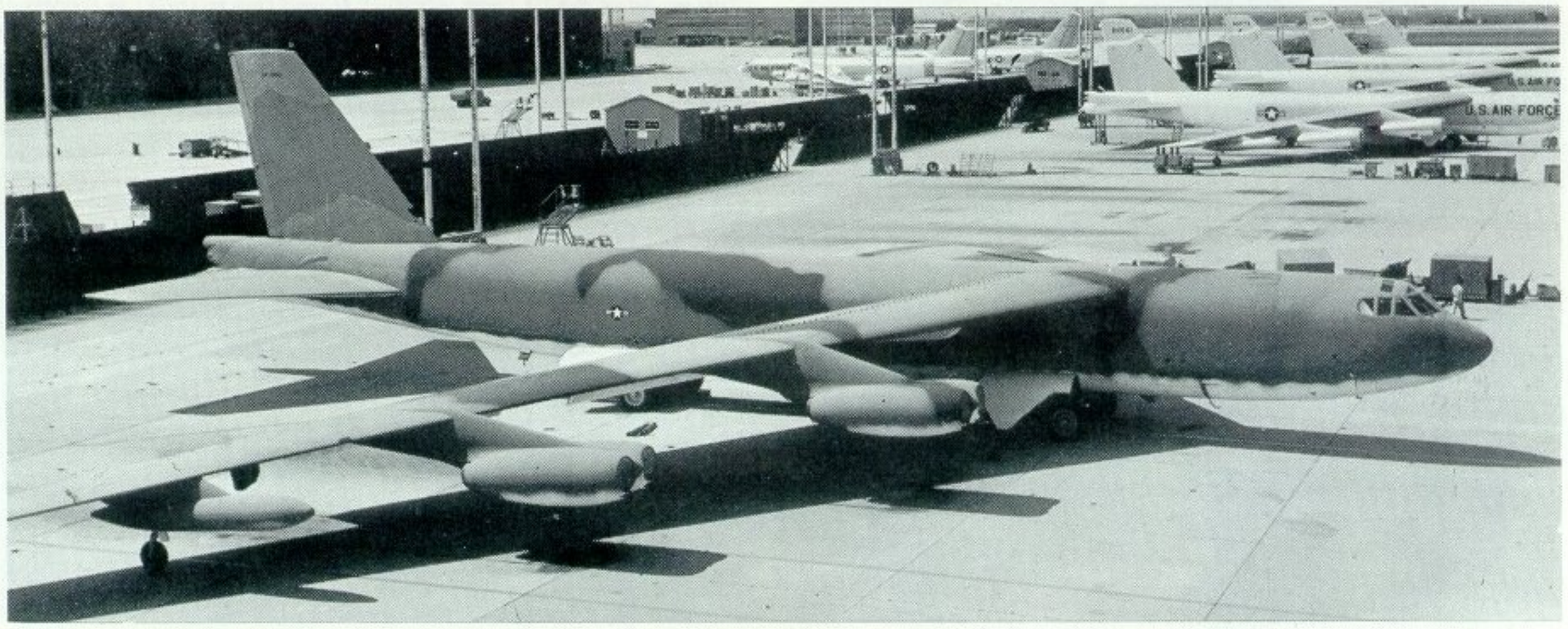
The B-52H – the Boeing Model 464-261 – was the last of the B-52 line and no higher designations were assigned to later modifications. One hundred and two were built on two contracts, each marking the first procurements of a new fiscal year. USAF serials were 60-1 to 62 and 61-1 to 40 (with corresponding c/ns. 464366 to 464467).

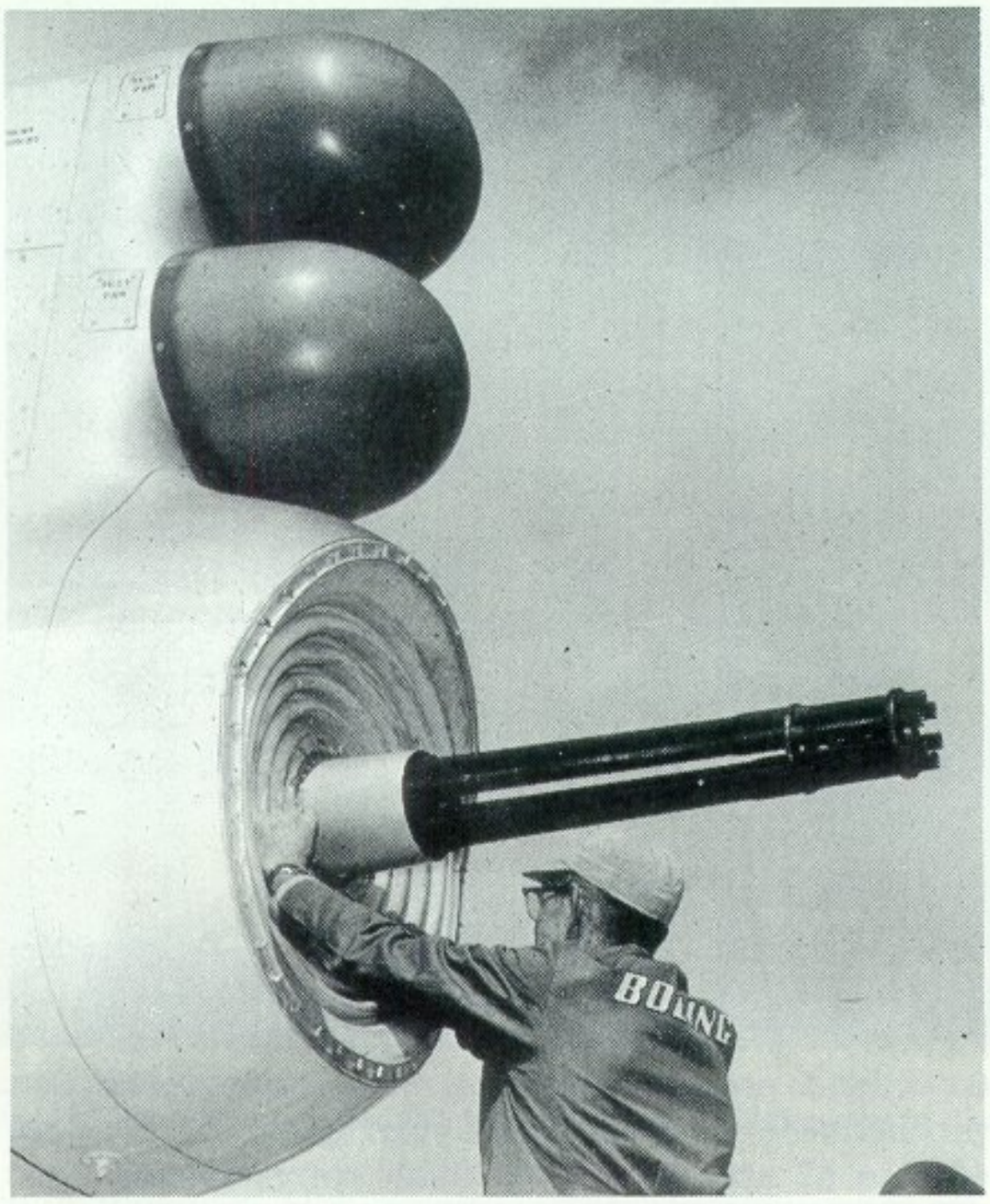
The B-52H was also originally intended as a carrier for the Douglas GAM-87A Skybolt – a two-stage, solid-propellant ballistic missile with nuclear warhead and range of 1,150 miles. However, when the Skybolt programme was cancelled, B-52Hs carried paired Hound Dogs like the B-52Gs.

With the same short vertical tail as the B-52G, the distinguishing feature of the B-52H was the use of 17,000-pound static thrust Pratt & Whitney TF33-P-3 turbofan engines. This was a development of the standard J57 to what is known as a "fan" or "by-pass" engine. They have larger forward compression stages, resulting in larger-diameter intakes and incorporate by-pass air outlets that considerably alter the appearance of the nacelle.

A further appearance change came about by the substitution of a six-barrel 20-mm. cannon – nicknamed

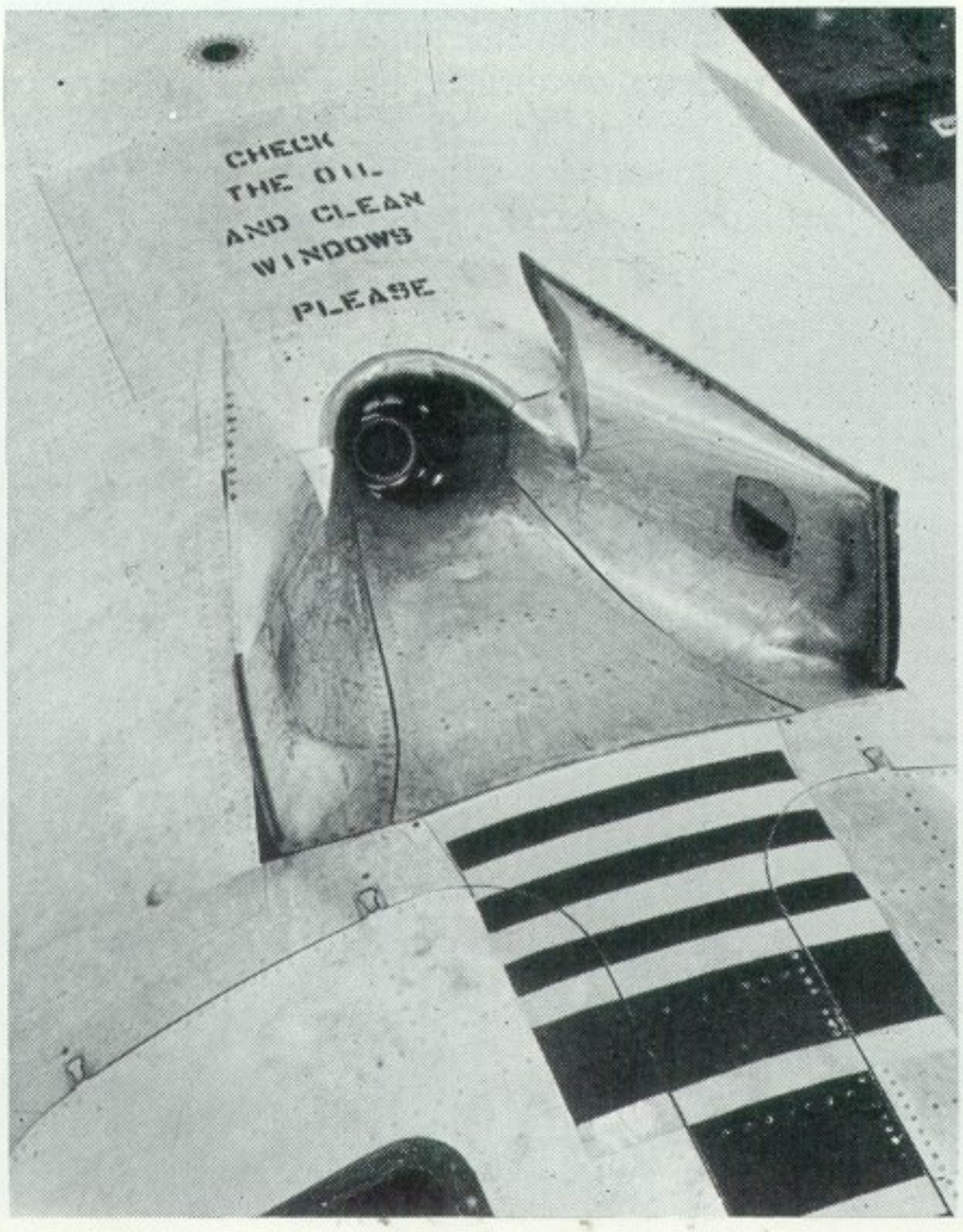
A B-52G in standard two-tone green and tan camouflage paint with white undersides. Note the small size of the national marking on the fuselage and relatively small fin serial (AF76480). No national markings are used on the black-bottomed B-52s operating over Viet Nam. (Photo: Boeing)





Tail armament of the B-52H was changed from a battery of four 50-calibre (0.50-inch) machine-guns to a six-barrel 20-mm. cannon known as a "Gatling Gun". (Photo: Boeing)

Close-up view of the in-flight refuelling receptacle on top of the B-52 fuselage and a short distance behind the pilot's cabin. The doors are opened only during refuelling; note the facetious stencilled message to the boom operator. (Photo: Boeing)



the "Gatling Gun" – for the original four-gun (0.50-in.) tail turret armament.

Costing $8,965,597, the first B-52H rolled out of the factory on September 30, 1960 and the last on June 22, 1962. The last B-52H was delivered to Strategic Air Command on October 26 to end the eight-year production run of the B-52. It was the 467th B-52 built at Wichita out of a total of 744 B-52s of all models.

B-52 OPERATIONS

Conceived as a long-range, high-altitude heavy bomber with reconnaissance capability, the B-52 was originally put into service as such. However, changing defence systems of other nations forced revision of B-52 operating concepts. To enable the big bomber to reach its targets by flying under defensive radar screens, the airframes were extensively modified to permit high-speed operation at ground level.

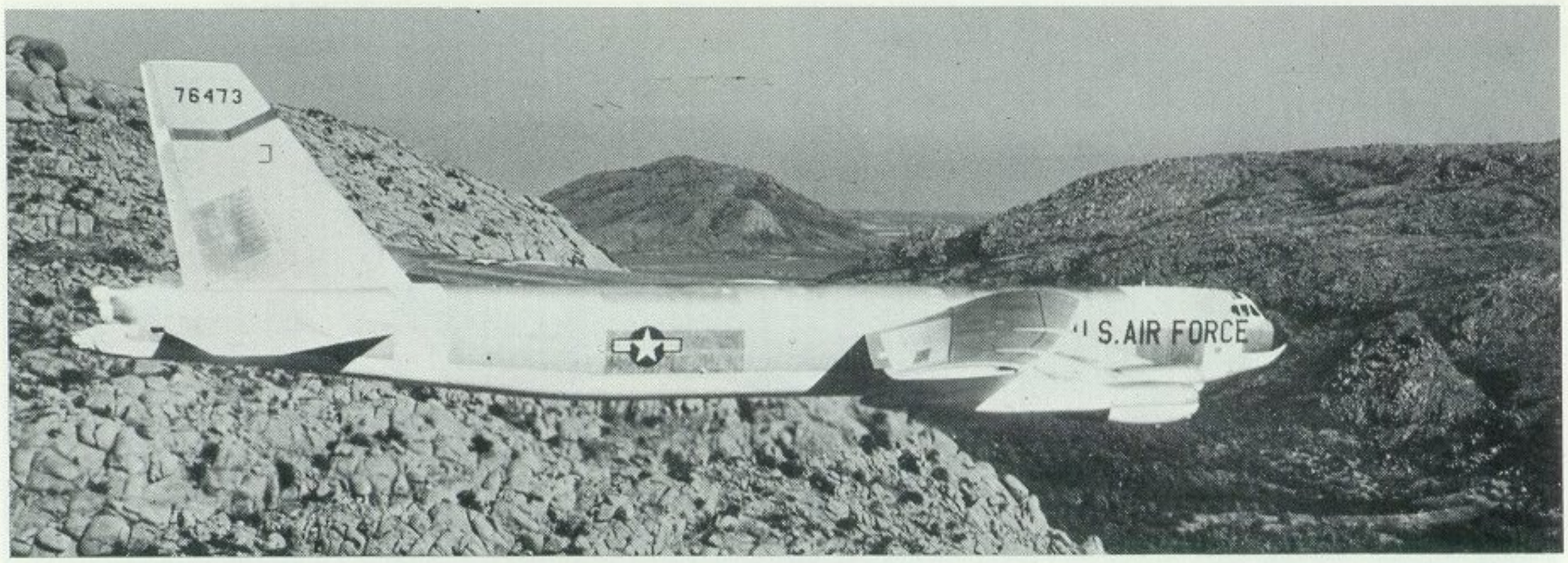
Continuous changes have been made to the electronic defensive and countermeasures carried including the use of the ADM-20 Quail decoy. This is a small un-manned turbojet-powered drone launched by the B-52 to fly in its vicinity so as to present on defensive radars a target simulating the B-52.

While conventional and nuclear bombing capability has been retained, "stand-off" weapons in the form of the AGM-28 Hound Dog nuclear missile have been carried since 1960 – one under each inboard wing section. The B-52H was to have carried four GAM-87A Skybolts but the programme was cancelled, as has been stated already, the B-52Hs were adapted to Hound Dogs.

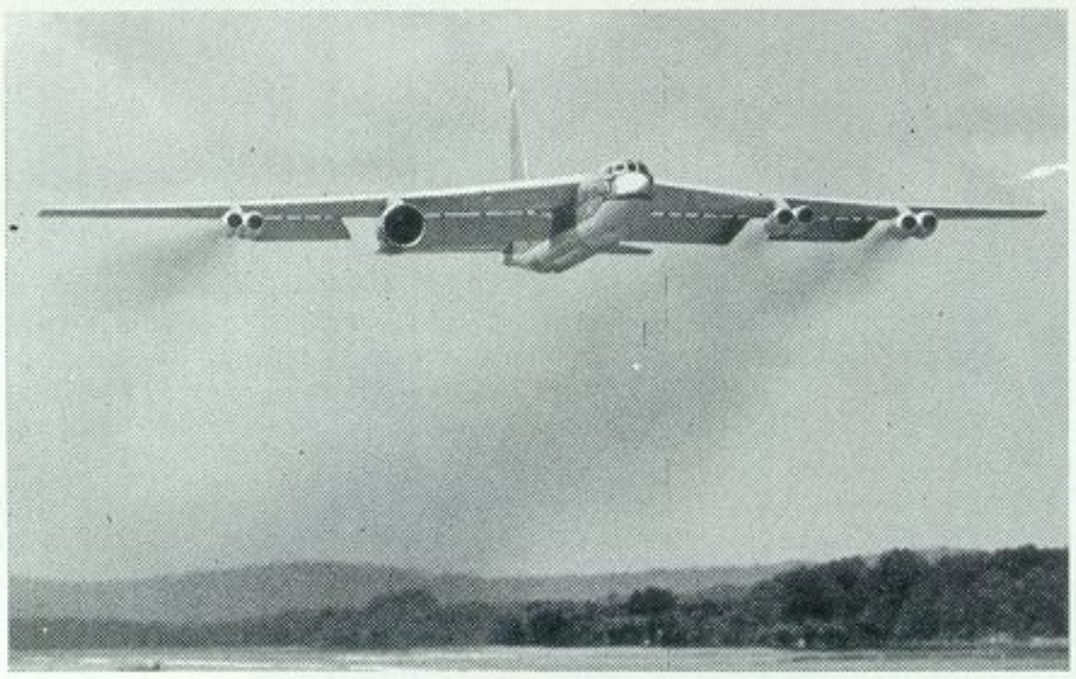
In 1971, contracts were awarded to Boeing to manufacture kits to adapt 281 B-52G and B-52H models to carry the AGM-69A SRAM or short-range attack missile. B-52s can carry 20 of these SRAM solid-propellant nuclear missiles, eight in a rotary launcher in the bomb-bay and six each on two wing pylons. The first operational SRAMs were delivered to Loring Air Force Base, Maine, in April 1972.

A unique feature of the AGM-69A is its two-pulse powerplant facility – the first restartable solid-propellant rocket motor – developed by Lockheed Propulsion as the LPC-415. As a supersonic missile ("approaching Mach 3.0" has been quoted as an unofficial estimate), the AGM-69A offers a variety of trajectories and can be launched in salvoes a few seconds apart – to arrive in the target area from different directions.

Test model of B-52H (with AGM-28 Hound Dog missiles) in process of aerial refuelling. (Photo: Boeing)



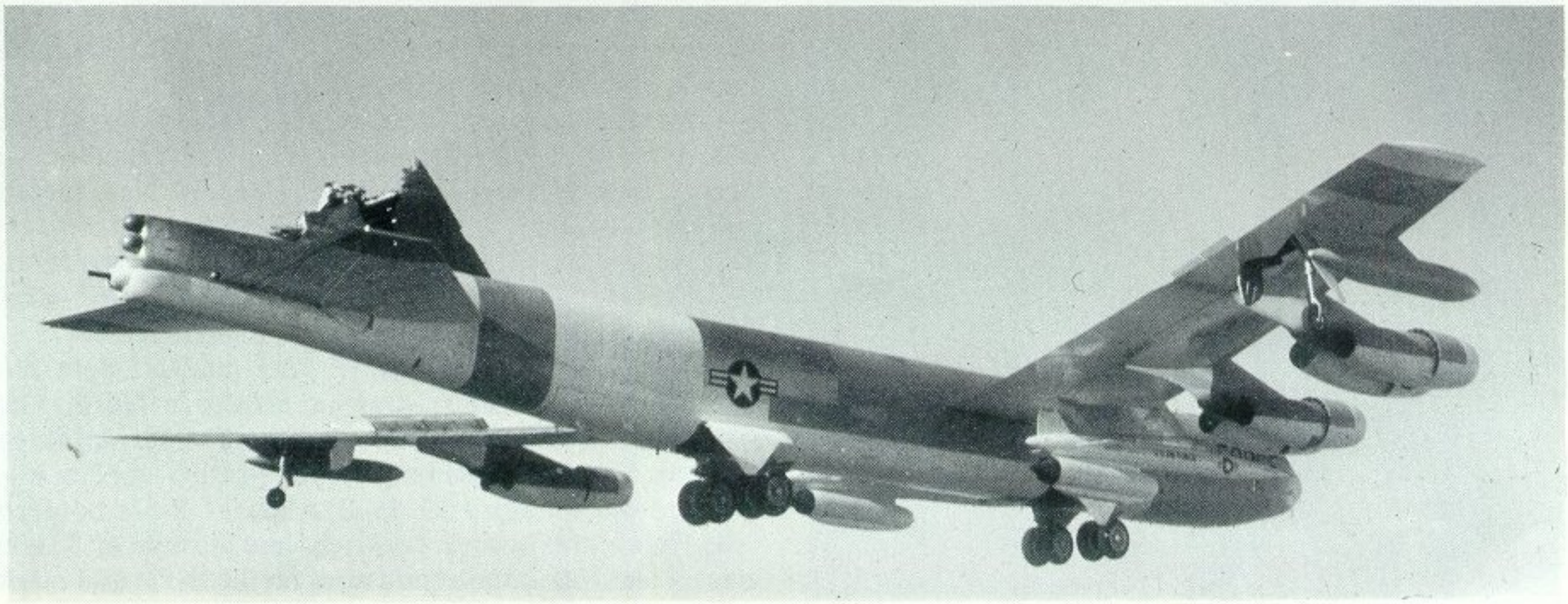
A B-52G hugs rocky and unwelcoming terrain during a low-altitude test mission. (Photo: Boeing)

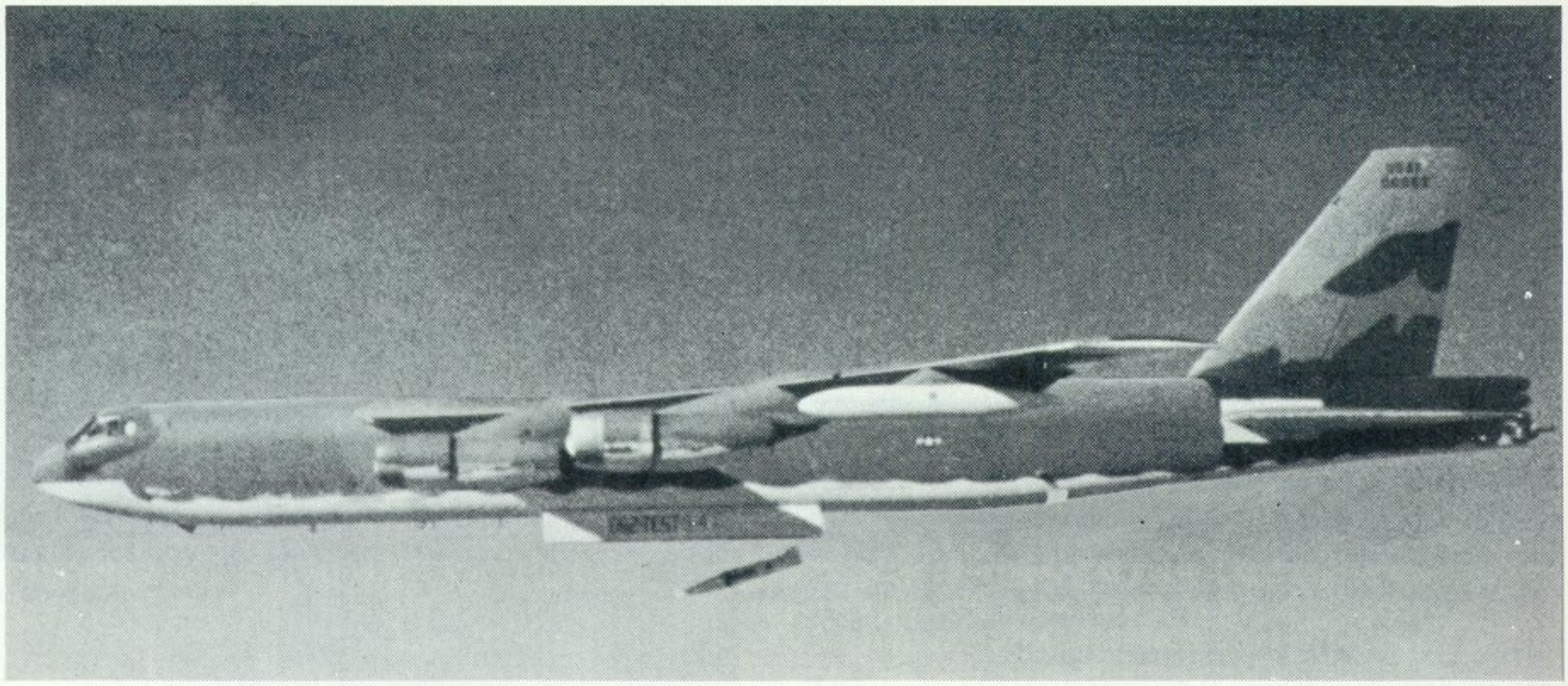


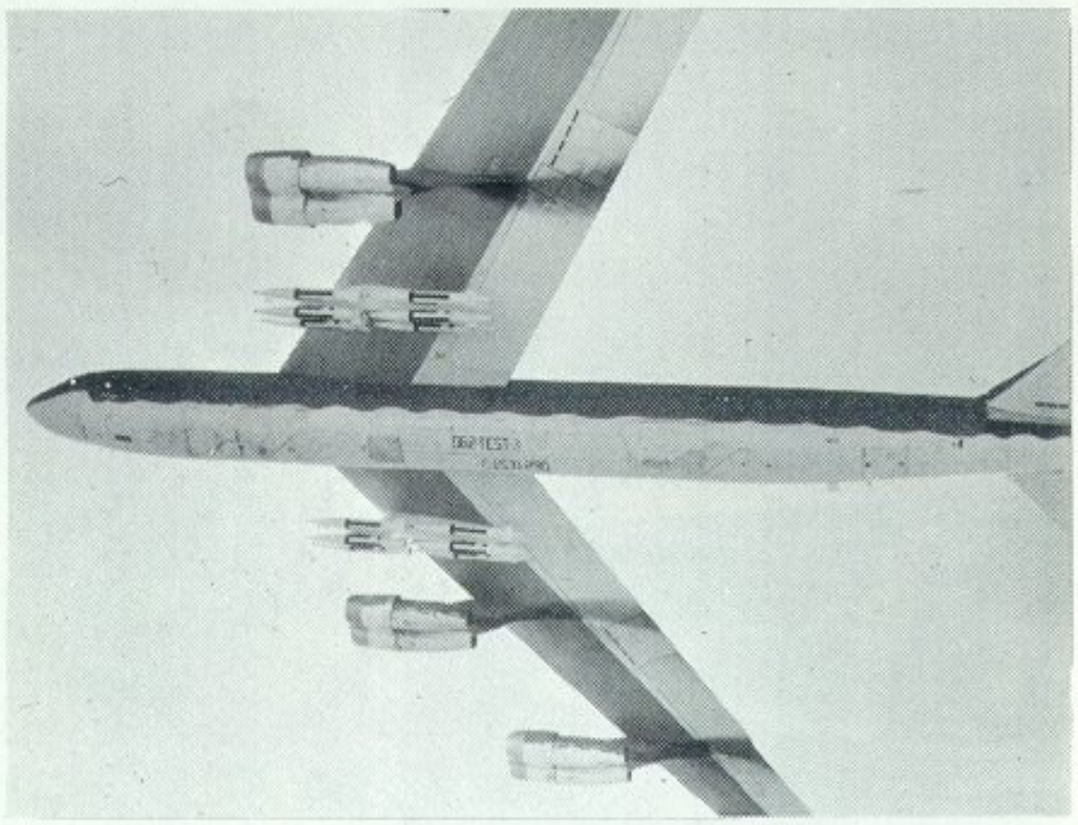
This B-52 was leased to Pratt & Whitney as a flying test bed for the new 45,000-pound-thrust JT9D engines developed for use on the Boeing 747 transport. (Photo: Pratt & Whitney)

The B-52H was intended to be the carrier for the Douglas GAM-87 Skybolt missiles, but that programme was cancelled and the bombers carried AGM-28 Hound Dogs instead. This B-52H carries a full complement of four dummy Skybolts. (Photo: Boeing)

During a flight near the Rocky Mountains, this B-52H encountered severe turbulence and lost almost the entire vertical tail surface. The crew was able to keep the B-52 under control and return to base for a safe landing. The Hound Dogs are still in position. (Photo: USAF via Boeing)

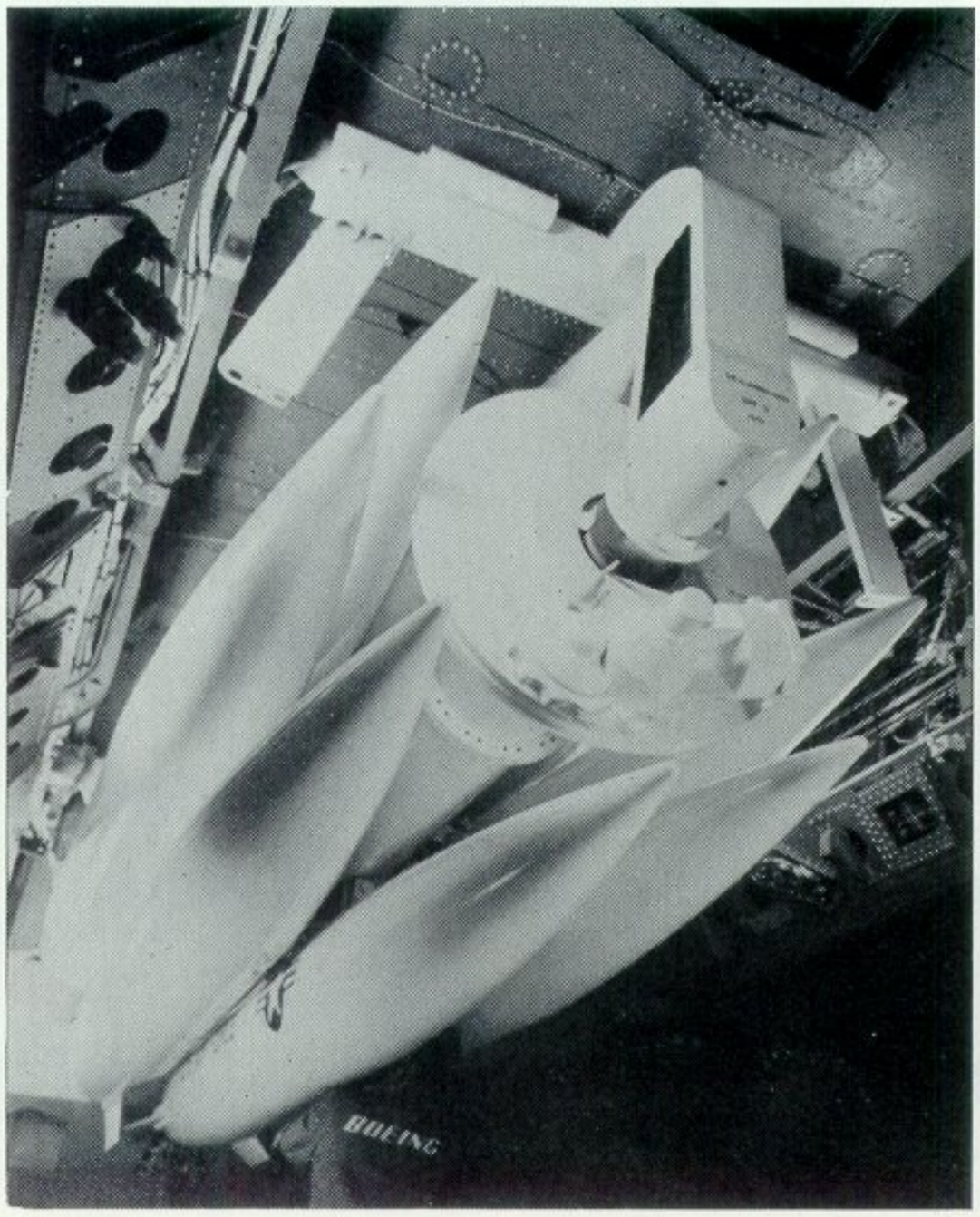






A pre-production test model of the AGM-69A SRAM missile is dropped from the bomb-bay of a camouflaged B-52H (USAF: 60-62 as 00062 on fin). The missile drops a hundred or more feet below the bomber before its solid-propellant rocket motor fires. (Photo: USAF via Boeing)

In 1972, modifications to the B-52G and H models were undertaken to equip them with up to 20 Boeing AGM-69A short-range attack missiles known as SRAM. Eight of these solid-propellant nuclear weapons are carried in the bomb bay and another twelve on external pylons; seen here on a test B-52H (USAF: 00062) (Photo: Boeing)



Eight AGM-69A SRAM missiles on a rotary launcher in the bomb-bay of a test B-52H. First operational flights with the new weapon began at Loring AFB, Maine, in April 1972. (Photo: Boeing)

In June 1972, Boeing was awarded a contract to adapt the B-52 to the new SCAD (Subsonic Cruise Armed Decoy Missile), a 14-foot wingspan, turbofan-powered decoy missile. The SCAD missile will be carried on the AGM-69A SRAM launcher as a replacement for the ADM-20 Quail. Although, like the ADM-20, the SCAD is a decoy, it also has warhead capability – thus posing a problem for enemy defensive radar.

Delivered in peacetime years, the B-52s of Strategic Air Command were used principally for routine training and proficiency missions until they began operations over Viet Nam in June 1965. Many special peacetime missions were carried out to show the capabilities of the B-52 to the world. These including a non-stop global flight by three B-52Bs in 45 hours, numerous out-and-return distance flights (of up to 26 hours' duration) and a distance record for unrefuelled flight of 12,519 miles made from Okinawa to Spain on June 22, 1962.

Operations against targets in Viet Nam began on June 18, 1965, with long-distance flights from Andersen Air Force Base on Guam. Distance to the Viet Nam targets is approximately 2,600 miles and a complete mission takes 12 hours. Since April 7, 1967, the Guam operations have been supplemented by much shorter (450-mile) flights from U-Tapao in southern Thailand.

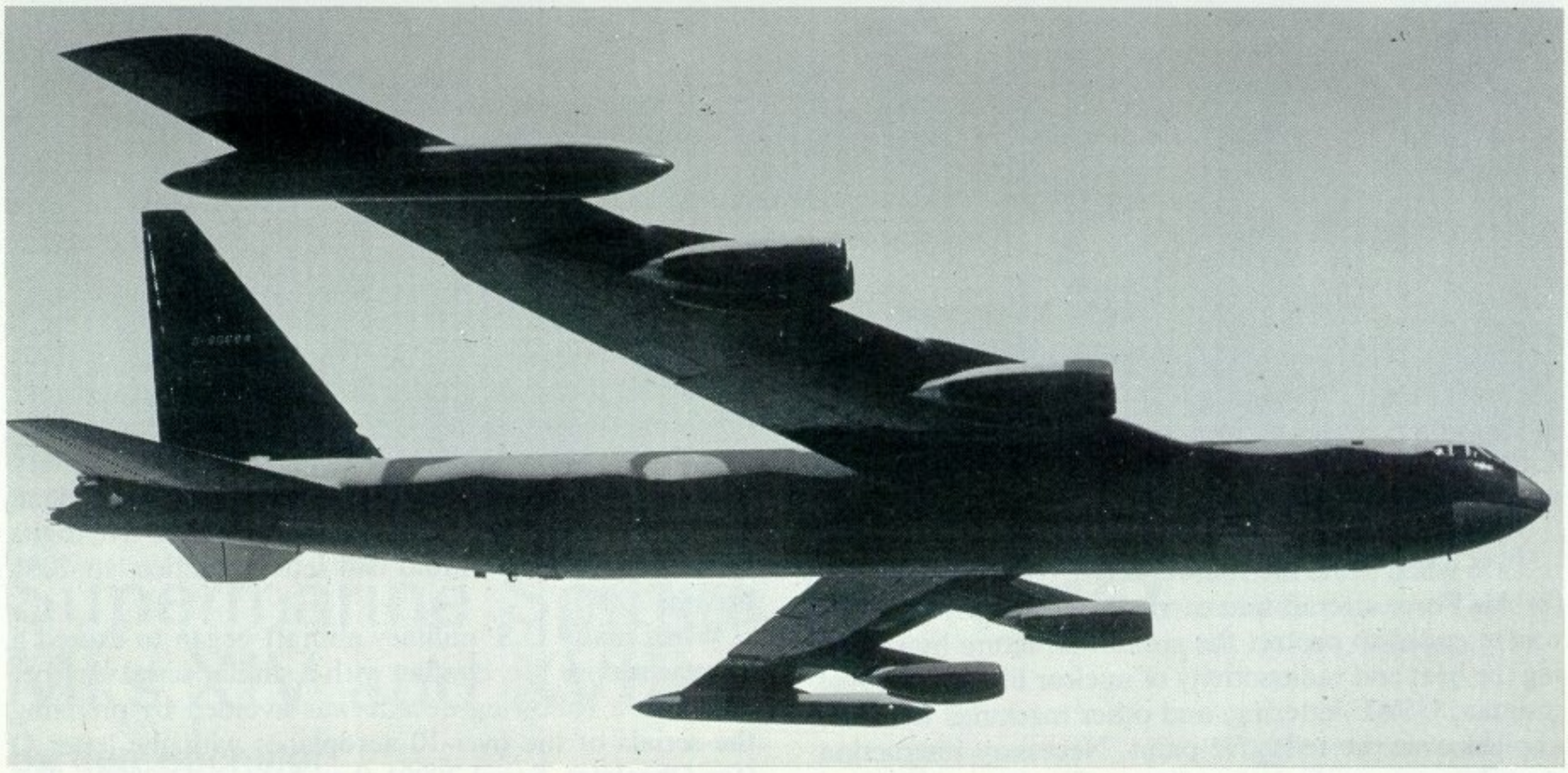
The B-52s, mostly older B-52D models, were not originally used against strategic targets in North Viet Nam but carried out tactical bombing of forward-area targets. Some strategic bombing of North Viet Nam was carried out on April 16, 1972, when 17 B-52s bombed the Hanoi area from a relatively low altitude of 30,000 feet. Electronic countermeasures on the B-52s and other

aircraft successfully jammed the Russian-developed, radar-controlled SA-2 surface-to-air defence missiles.

Weapons used are high-explosive 500- and 750-pound "iron bombs" to a maximum of 60,000 pounds for each aircraft. Up to 84 x 500-lb. or 42 x 750-lb. bombs can be carried in the bomb-bay plus an additional 24 of either size on two wing pylons. Bombs from a unit of three B-52s effectively cover a target box 0.6 by 1.8 miles long.

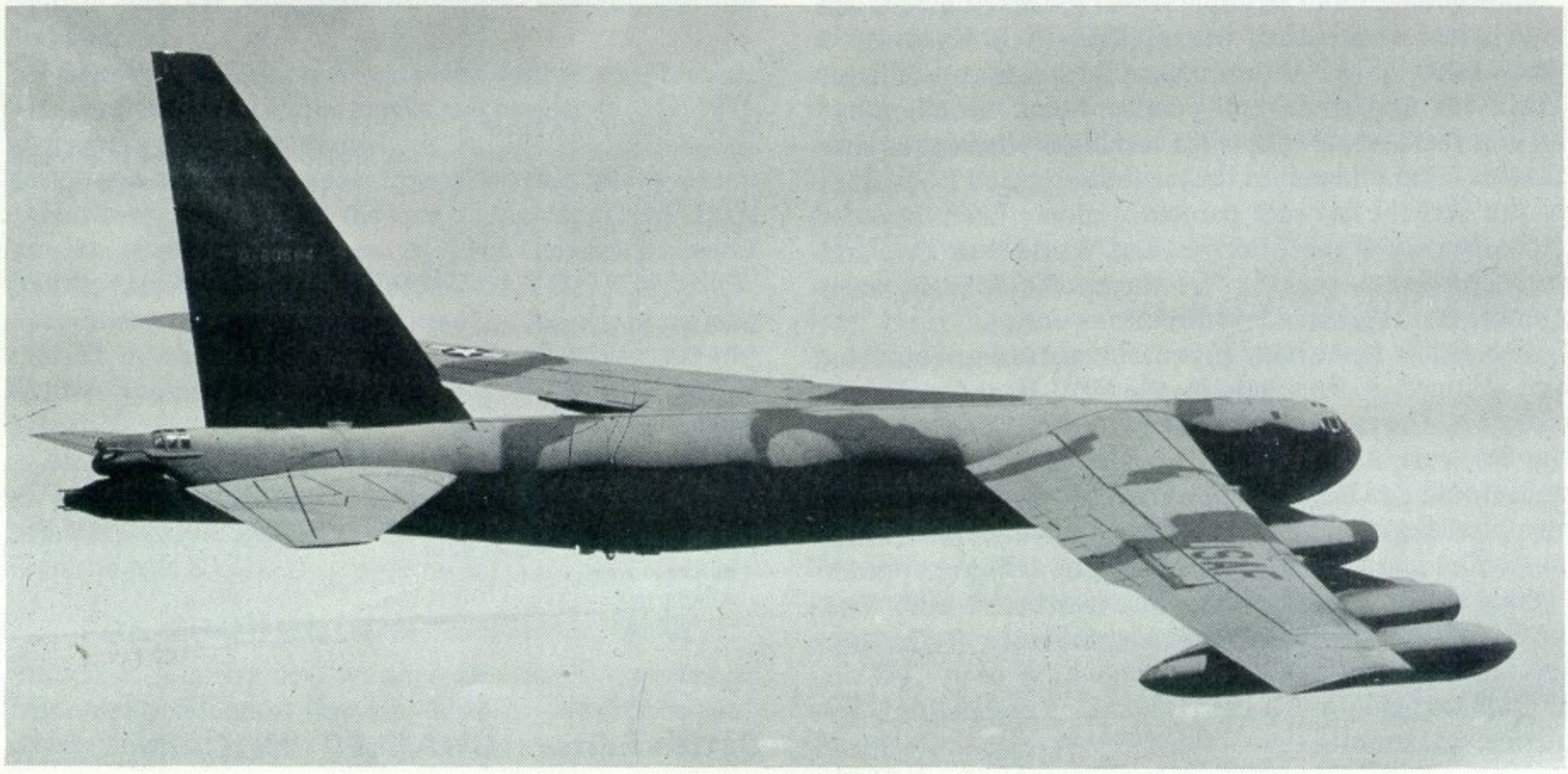
For a while, as part of U.S. defence policy, some B-52s were in the air at all times on airborne alert. These were armed and ready to head for designated targets in case of a surprise attack on the continental United States of America. This practice was soon abandoned in favour of ground alert status at widely-dispersed bases in the USA and elsewhere.

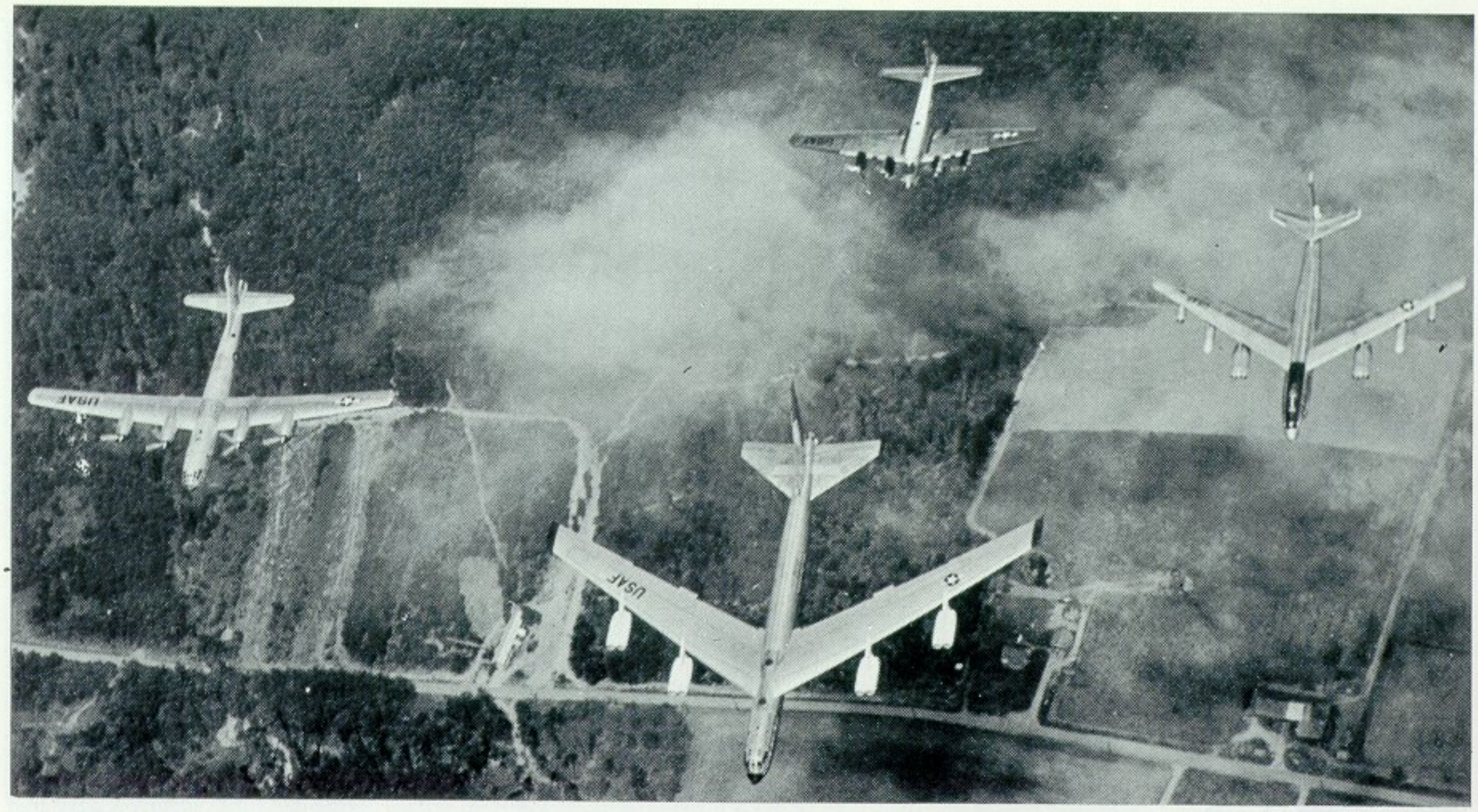
A Seattle-built B-52D (USAF: 65-100; here as 0-50100), dropping 500-lb "Iron Bombs" in train. Eighty-four of these bombs are carried in the bomb-bay with an additional 24 bombs, either 500- or 750-pounders, carried on two wing pylons. (Photo: USAF via Boeing)



A Wichita-built B-52D (USAF: 56-684; as 0-60684 on the fin) in camouflage. Black undersides and vertical fin are used in Viet Nam operations. Serial number in red on the black fin. (Photo: Boeing)

The same B-52D (USAF: 56-684) showing off top decking camouflage pattern to advantage. (Photo: Boeing)





A quartet of Boeing's most famous bombers: From left to right, a B-29, B-52, B-17 and B-47. (Photo: Boeing)

B-52 MARKINGS AND COLOUR

The early B-52s were delivered in natural metal finish. While some parts were the familiar shiny "Alclad" duralumin, others appeared to be painted a silvery-grey. This was not paint in all instances but a different type of aluminium alloy.

Paint was added to the lower sides and undersurfaces in 1956 when white thermal-reflective paint was adopted for Air Force aircraft that carried nuclear weapons. This was intended to protect the aircraft structure by reflecting the heat and radioactivity of nuclear blasts. National insignia, USAF lettering, and other markings were not applied over the reflective paint. Necessary instruction stencils were applied in yellow paint over the white. Factory application of this white paint began with the B-52C; B-52Bs were painted during subsequent modification programmes.

Camouflage paint in tan and two shades of green, still with white undersides, was applied to B-52s in 1965 when other USAF aircraft were adopting camouflage. The B-52s used for dropping conventional "iron bombs" in Viet Nam soon adopted a modified scheme for that theatre – the undersides, lower fuselage, and both sides of the vertical fin were painted a glossy black like the night-fighters of the latter years of World War Two and early post-war period. On these, the USAF serial number is carried in red on the fin.

The B-52s have been unique in not using colourful and distinctive markings in the WW-II and post-war tradition. The principal marking has been the emblem of the Strategic Air Command on the nose (port side) of uncamouflaged B-52s assigned to SAC wings, backed up by a blue diagonal band covered with five-pointed white stars. The badge of the particular Bomb Wing appears against the blue band on the nose (starboard side). The SAC emblem is not used on camouflaged B-52s, but special unit or individual markings have been used on aircraft participating in USAF bombing competitions or other special events.

The individual USAF serial number has always been applied to both sides of the vertical fin. At first, a short serial like 52-1 was expanded to a minimum of four digits on the tail, as 2001. The number 5, representing the (Fiscal Year) decade, was eliminated since military aircraft were not expected to operate for more than 10 years. In 1958, the serial was expanded to five digits in keeping with the radio call letter practice, so 2001 became 20001.

When many U.S. military aircraft began to exceed a 10-year service life, conflict with a similar serial number issued in a following decade was avoided by prefixing the serials of the over-10 aeroplanes with the letter O (for Obsolete). Serial 20001 then became O-20001. The dash was important in distinguishing the prefix letter from the "zero" number as in the case of B-52H serial 60-1, whose tail number when new appeared as 00001 and then became O-00001 in 1970.

B-52 SPECIFICATION

NOTE: Performance details, speeds. Rate-of-climb, service ceiling and range-with-load have not been officially released at time of writing (August 1972)
Span: 185 ft. 0 in.
Length: 157 ft. 7 in.
Height (to top of tail): 48 ft. 4½ in. (All models to B-52F). 40 ft. 8 in. (B-52G, B-52H).
Wing area (total, flaps retracted): 4,000 sq.ft.
Aileron area: 107 sq.ft.
Spoiler area: 149 sq.ft.
Flap area (extended): 797 sq.ft.
Aspect ratio (mainplane): 8.55.
Dihedral (mainplane): 2.5°.
Incidence (mainplane: 6.0°.
Tailplane (horizontal tail), span: 62 ft. 4 in., area: 900 sq.ft.
Wheelbase: 49 ft. 9 in.
Track, inboard main wheels: 62 in.
outboard main wheels: 136 in.
wingtip protection gear: 148 ft. 5 in.
Crosswind landing gear travel: 20°.

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