WARPAINT No. 45

MARTIN B-57 CANBERRA

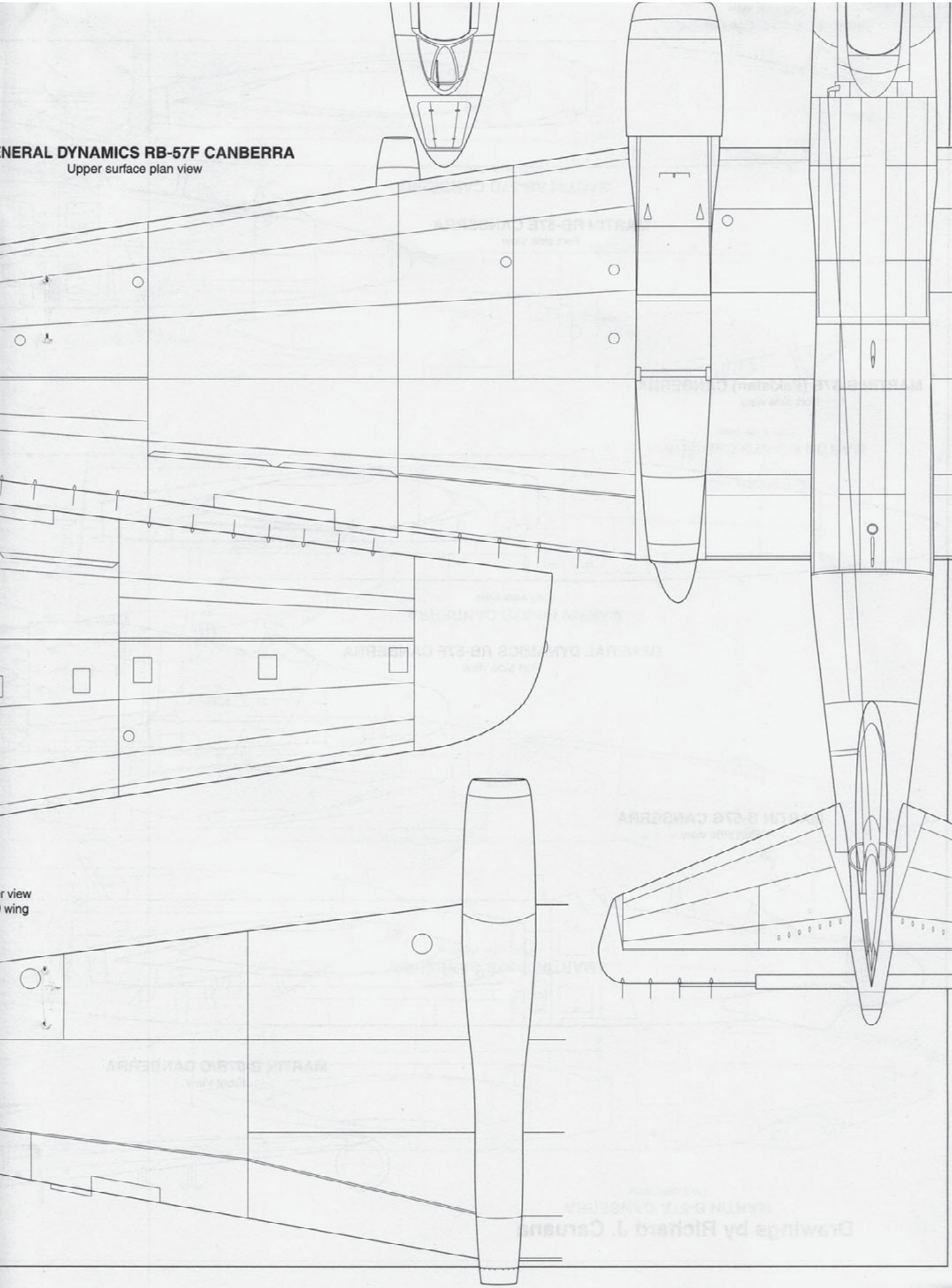
BY KEV DARLING

Target towing became a role for the B-57 towards the end of its USAF service. This aircraft, a B-57E Canberra was operated by the 3rd Target Towing Squadron based at George AFB. (Adrian Balch)

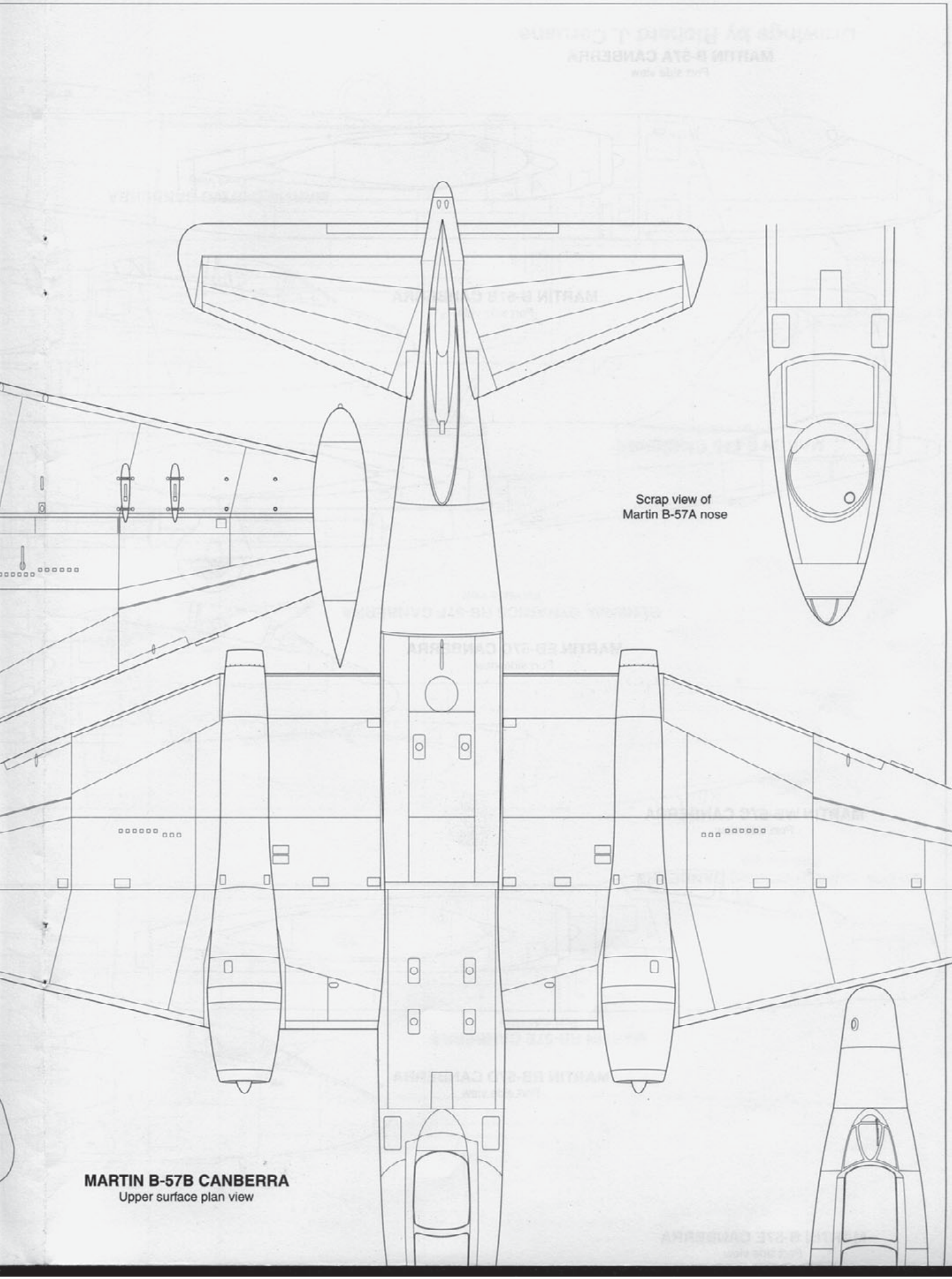
Martin B-57C Canberra, 53-5831, 134th DSES, 158th DSEG, Vermont Air National Guard. Light Gray overall with black nose and tail sections, edged in red; black engine cowlings and wingtip tanks. Standard national markings; lettering in black, serial and 'Vermont' in red. Outstanding Unit Award ribbon and ADC stickers on tail

Drawings by Richard J. Caruana

NERAL DYNAMICS RB-57F CANBERRA
Upper surface plan view



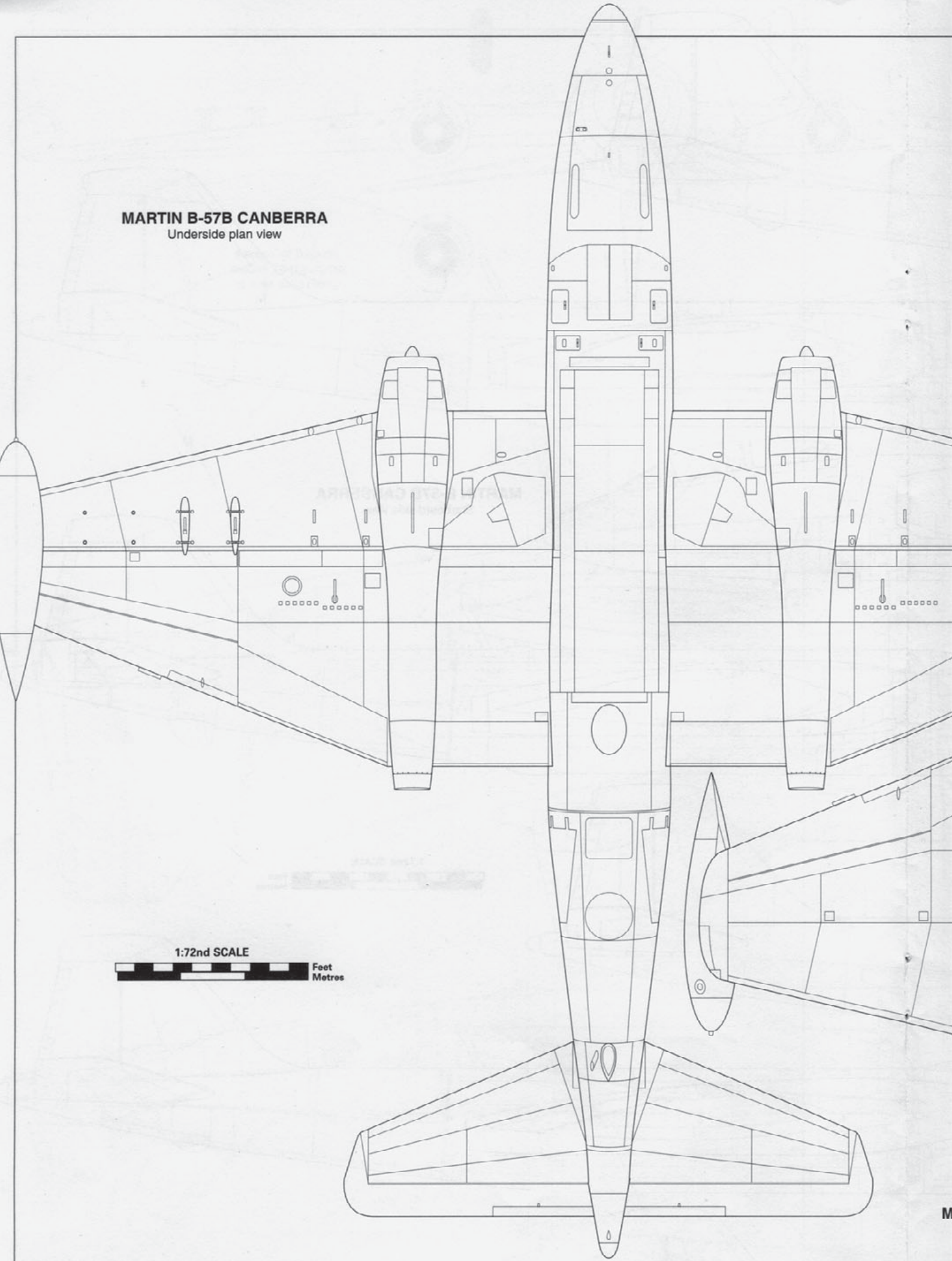
r view
wing



MARTIN B-57B CANBERRA
Upper surface plan view

MARTIN B-57B CANBERRA

Underside plan view

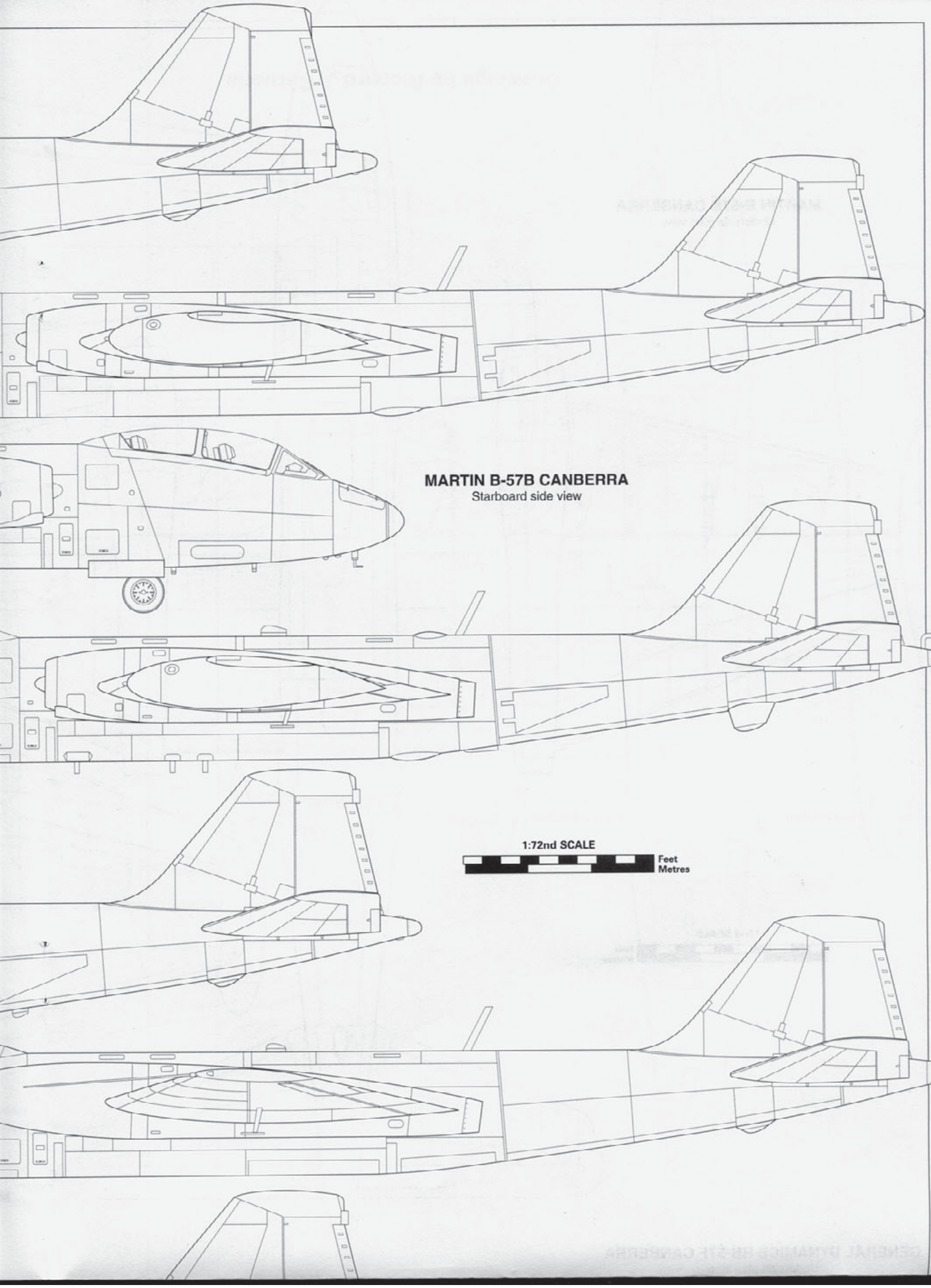


1:72nd SCALE

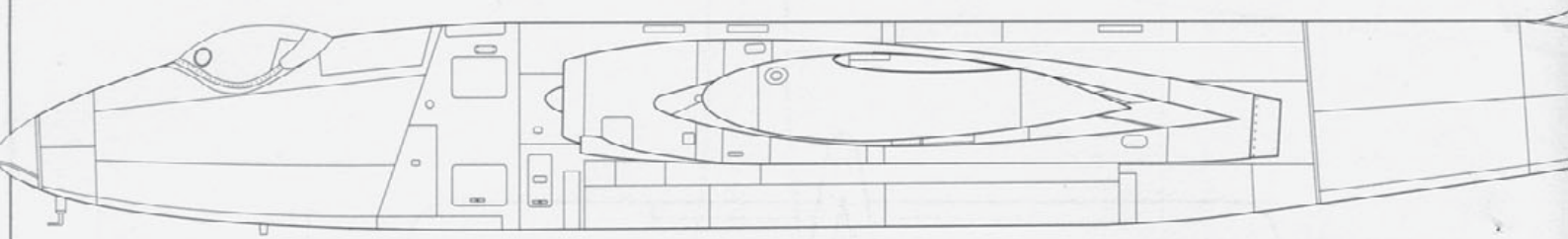
Feet
Metres

GENERAL DYNAMICS RB-57F CANBERRA

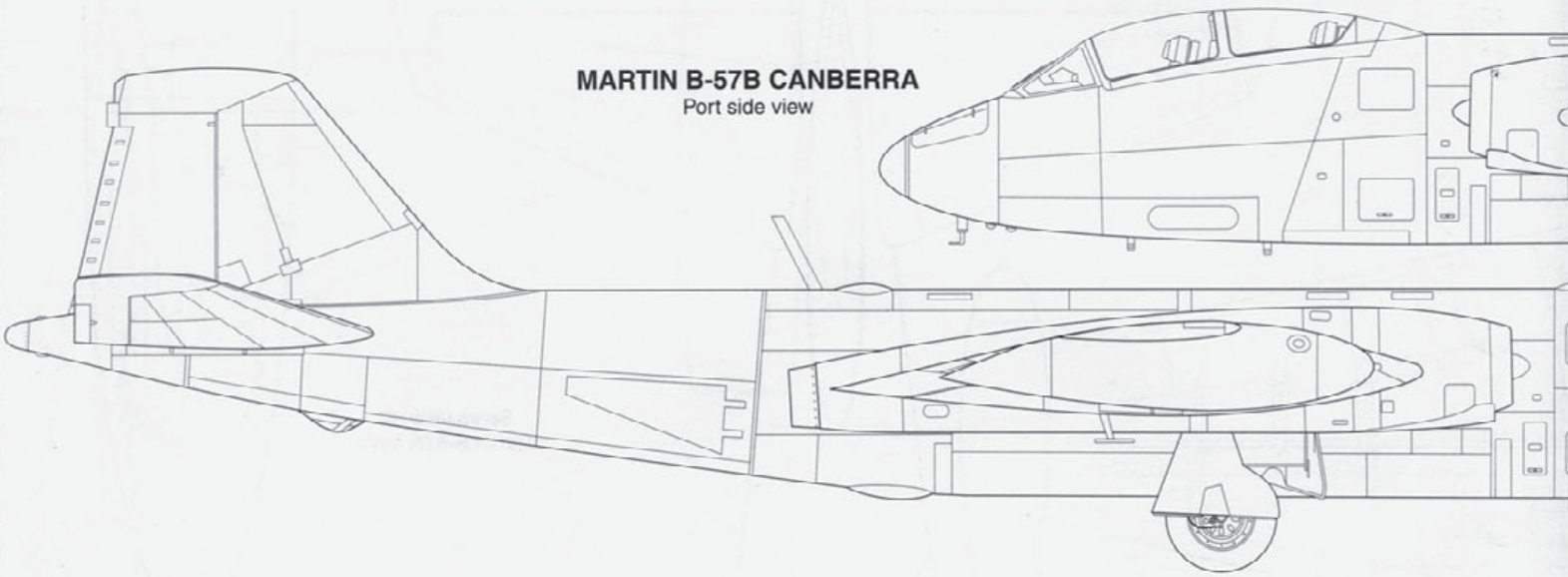
Underside plan view


MARTIN B-57B CANBERRA
Starboard side view
1:72nd SCALE
Feet
Metres

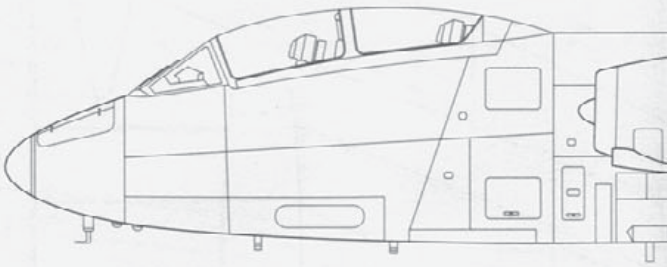
MARTIN B-57A CANBERRA
Port side view



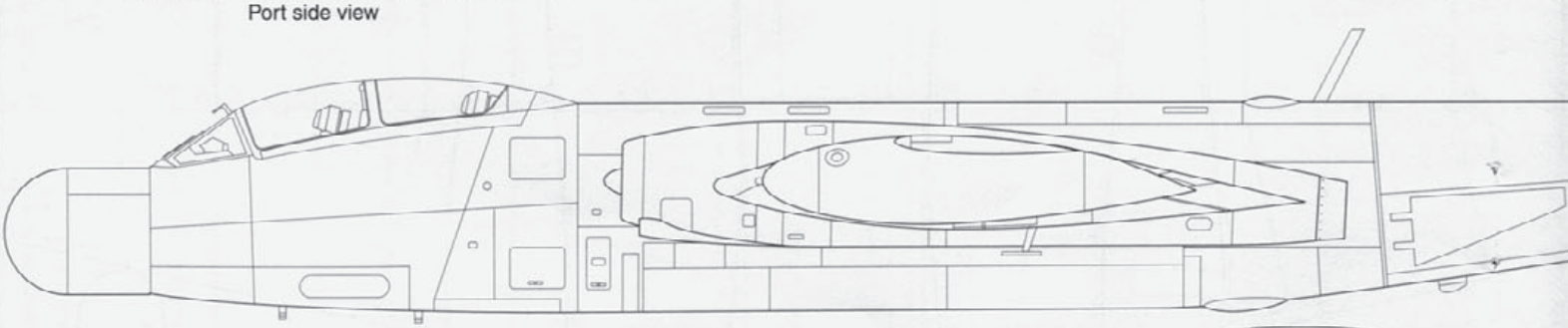
MARTIN B-57B CANBERRA
Port side view



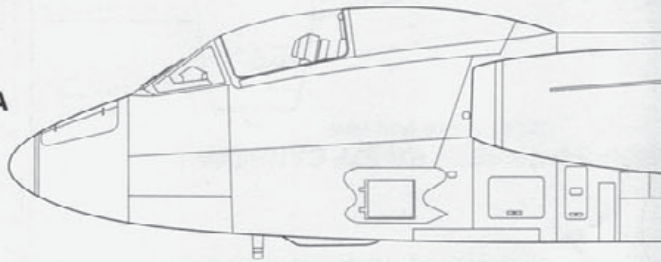
MARTIN EB-57D CANBERRA
Port side view



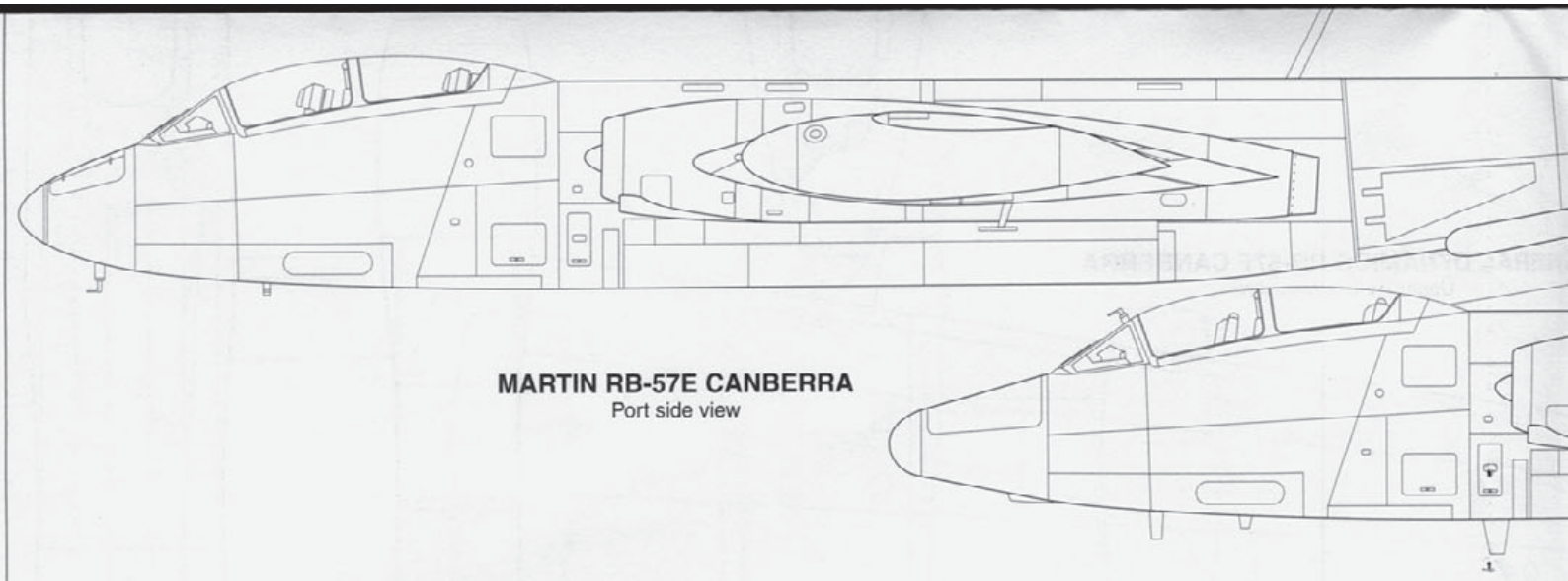
MARTIN WB-57C CANBERRA
Port side view



MARTIN RB-57D CANBERRA
Port side view

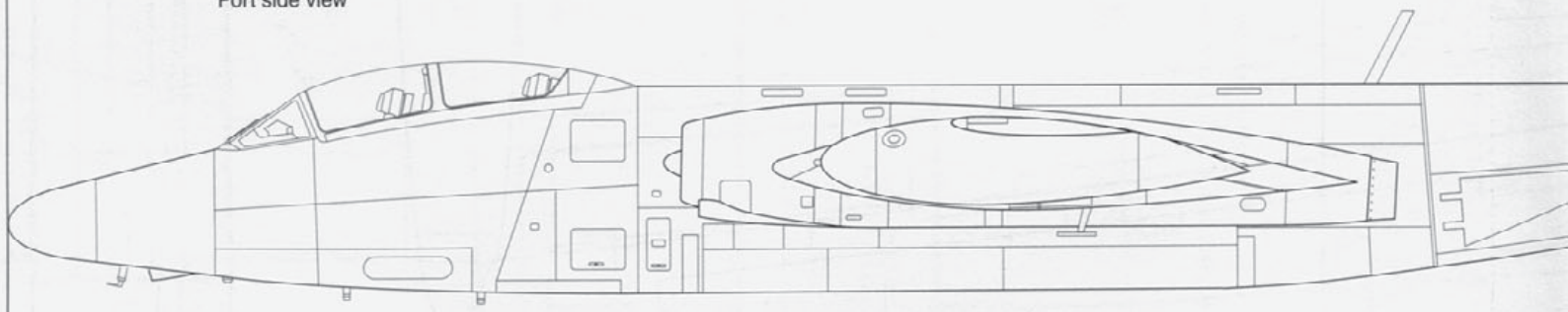


MARTIN B-57E CANBERRA
Port side view

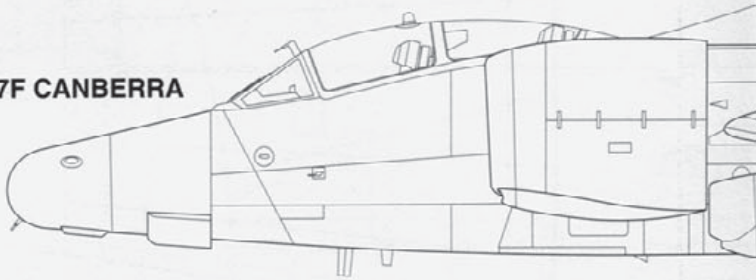


MARTIN RB-57E CANBERRA
Port side view

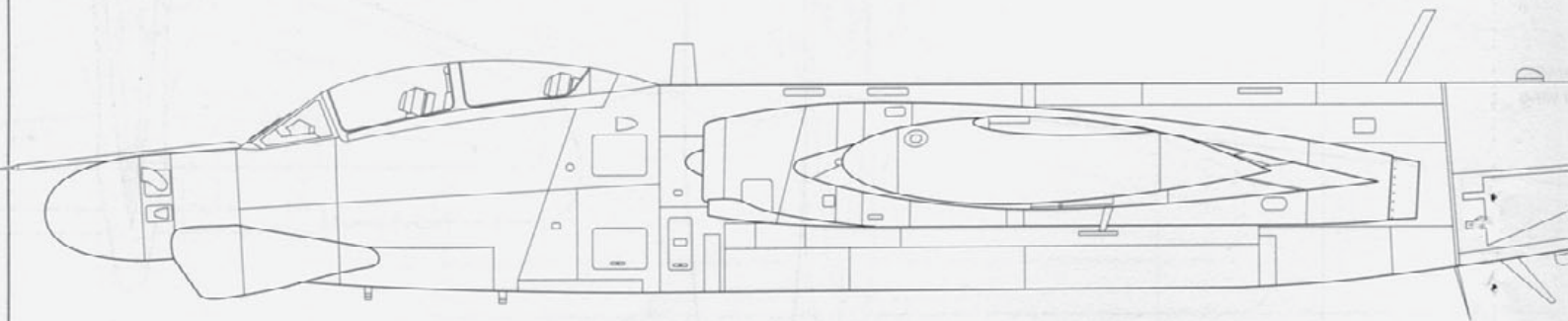
MARTIN B-57B (Pakistan) CANBERRA
Port side view



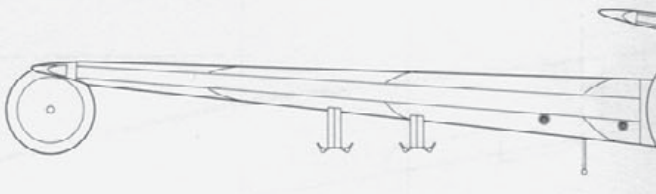
GENERAL DYNAMICS RB-57F CANBERRA
Port side view



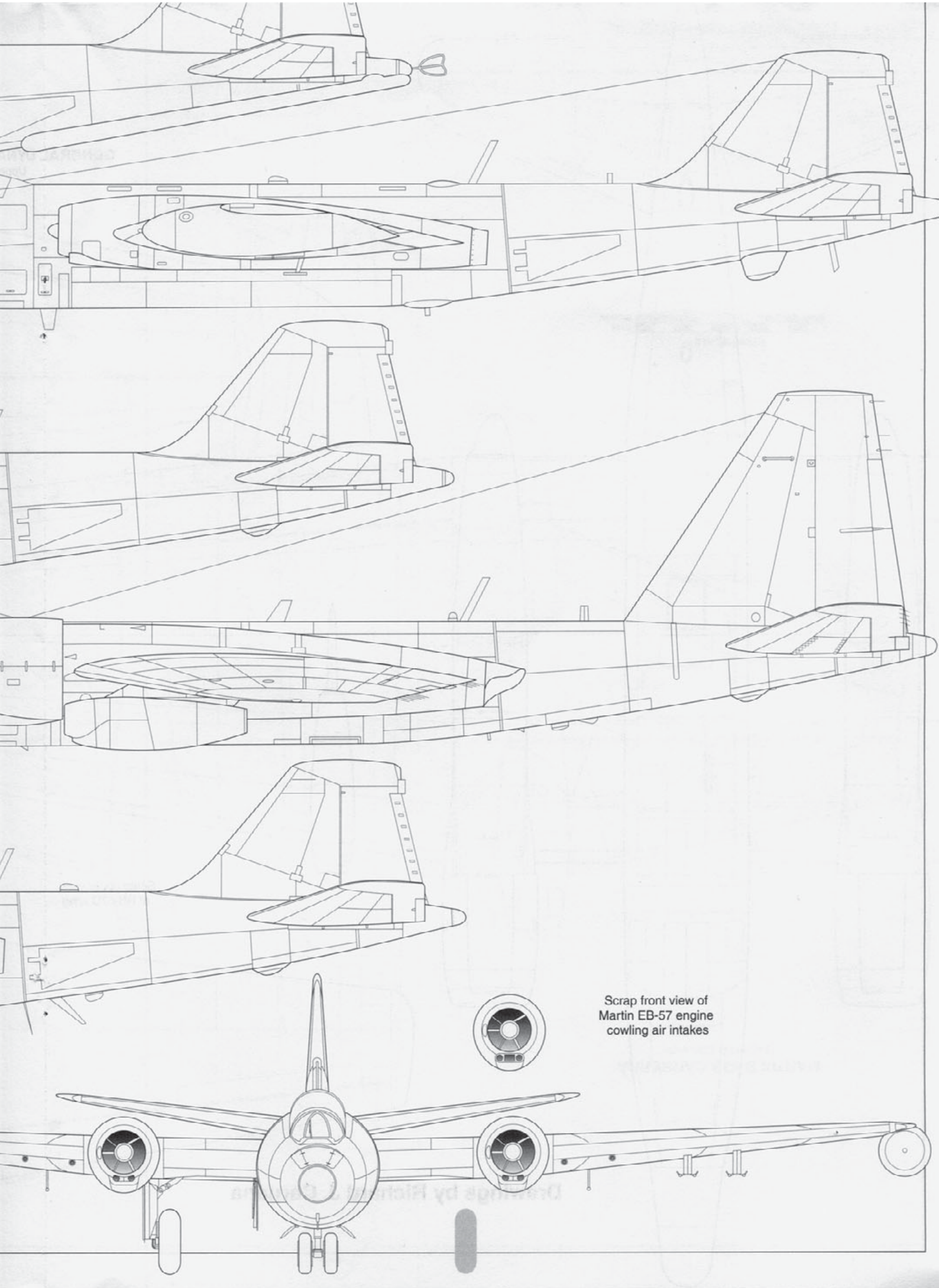
MARTIN B-57G CANBERRA
Port side view



MARTIN B-57B/C CANBERRA
Front View



Drawings by Richard J. Caruana



Scrap front view of
Martin EB-57 engine
cowling air intakes

Martin B-57 CANBERRA

By Kev Darling

Possibly one of the biggest surprises in aviation history was the purchase of the English Electric Canberra for use by the United States Air Force, the last such occasion was the license build of the De Havilland DH-4 in World War 1. At the time the air force was transiting between piston and jet power, on one hand B-29s, B-50s and Convair B-36s rumbled about the skies whilst their replacements, the Boeing jet bombers were beginning to roll off the Seattle production lines. In contrast the light bomber units were still equipped with the Douglas B-26 Invader which had proven successful during the latter part of the World War 2 and later the Korean War, but was coming to the end of its service life or so it was thought.

During the Korean War which had started on 25 June 1950 the B-26 Invader had proven capable in its task of night interdiction however there had never been enough aircraft or crews for the task and the lack of space for expandability was having a delete-

The second English Electric Canberra B.2 WD932 sold to the Martin company to act as a pattern aircraft for the B-57 seen over Chesapeake Bay, Maryland during early test flights. (Martin via Terry Panapolis)

rious affect on the war, also fleet losses for various reasons meant that there would be no B-26 Invaders left by the end of 1954.

As the war progressed the B-26 fleet was sliding into obsolescence therefore in 1950 the USAF cast around for a suitable replacement. The start date for this process was 16 September and the preliminary requirement called for a light jet bomber with a service ceiling of 40,000 feet, a cruising speed of 400 knots, a maximum speed of 550 knots and a range of 1,000 miles. Other requirements included an ability to operate from

Martin B-57A Canberra 52-1425 one of eight pre-production aircraft for the USAF under contract AF33(038)-22617. (via Terry Panapolis)

unimproved airstrips, to be able to search for targets at low altitude and speed and it should be capable of destroying mobile and stationary targets at night or in bad weather using either conventional or nuclear weapons. Another requirement put forward by USAF was the need to perform in the reconnaissance role.

Heading the selection team was Col. Frank Allen. After months of deliberating

With lines of B-57 Canberras under construction in the background this dramatic night picture shows one aircraft being rolled out for transfer to the paint shop for a coat of gloss black (BBA archives)

various aircraft specifications the team had narrowed the field down to a total of five designs. American manufacturers were represented by the Martin XB-51 tri-jet bomber that had been test flying for a year, the four engined North American B-45 Tornado and the North American tri-engined AJ-1 Savage, powered by a pair of radial piston engines with a J-33 turbojet in the rear fuselage to boost take off performance, which was in the process of entering US Navy service. Foreign representation was provided by the Avro [Canada] CF-100 twin engined fighter and the English Electric Canberra.

During the process of eliminating the contenders Col. Allen's team concentrated upon numerous aspects of each aircraft. First and foremost were the inbuilt bombing and navigation systems, all weather navigation systems and weapons release and guidance systems. Each design was also probed for the performance of the airframe and its engines. Quickly out of the picture were the Martin XB-51, the B-45 Tornado and the AJ-1 Savage all of whom were deficient in various aspects of their airframe, avionics and powerplant design. Following on from their elimination came that of the Avro [Canada] design which went due to its antecedents as a fighter.

This left the Canberra as the only contender which had an excellent airframe and engines, but was deficient in the avionics department. In fact the selection team had been to Farnborough for the SBAC show in 1949 to see the Canberra put through its paces by English Electric's Chief Test Pilot R. P. 'Bea' Beamont. Their first comments on seeing the aircraft was that it looked pedestrian in nature and the engines buried in the wings were an idea that the observers were unsure of. All this changed when the prototype was put through its paces proving that a bomber of such a wing area could be extremely agile.

The AJ-1 Savage was rejected due to its low top speed, its mixed engine fuel requirements and its complicated hydraulic system all of which made it vulnerable to any form ground fire. Also missing was any form of defensive armament or forward firing attack armament. The B-45 Tornado, in service with the 47th Bombardment Wing, was removed from the competition as it was in essence a jet powered airframe based on World War 2 technology.

The only other foreign design in the competition, the Avro Canada CF-100, was eliminated as it was considered to small to carry sufficient bombs and fuel without major redesign. The home front runner was the Martin XB-51 which featured some technological improvements such as a swept wing of variable incidence. Power was supplied by three J-47 engines, two under the wings and one in the tail. Further innovations included an undercarriage layout similar to that of the B-47 and the first appearance of a rotating bomb door. As built the XB-51 was a fast manoeuvrable aircraft which was limited by its ability to pull a maximum load of 3.67g. Other shortcomings were a lack of range and endurance and the bomb door was too small for much of the ordinance in the USAF Inventory. Given the time needed to develop the XB-51 its challenge came to naught as the Canberra was declared the winner.

At first sight the Canberra seemed an unlikely contender for such a major contract. English Electric had very little experience in design leadership although it had experience in constructing aircraft for others and had gained the services of W.E.W. Petter in 1944 as Chief Designer. Assisting Petter was the newly recruited F. W. Freddy Page who had come from Hawker Aircraft. This was the team that would start to develop a jet pow-

A Martin-built B-57A of the 1 TRS, 10 TRW based at Laon, France. The aircraft is gloss black overall with red walkway lines. The unit markings on the fin and rudder are yellow over black. The canopy surround is thought to be white. (BBA archives)

Martin B-57 Canberra camouflage and markings

MARTIN B-57 COLOUR KEY

Natural Metal | Black | Tan FS.30219 | Mid Green FS.34102 | Dark Green FS.34012 | Orange Red 12197 | Light Gray | Insignia Yellow | Insignia Red

Mid Green | Insignia Blue | Dark Green (Pakistan AF) | Insignia Green (Pakistan AF) | NASA Medium Blue

Drawings by Richard J. Caruana

English Electric Canberra B Mk 2, WD940, reserialled 51-17352 and wearing USAF markings. Gloss Black undersides, fin and rudder with Medium Sea Grey upper surfaces; serial in red, white '2' on nose. This, together with WD932, served as pattern aircraft for the B-57

Martin RB-57A Canberra, 52-1457, 363rd Tactical Reconnaissance Group, Shaw AFB, South Carolina, 1955. Gloss Black overall with white canopy framing and tail tip; natural metal cowling front section and exhaust pipe. White/red checks on fin/rudder; red lettering on fin. Standard national markings

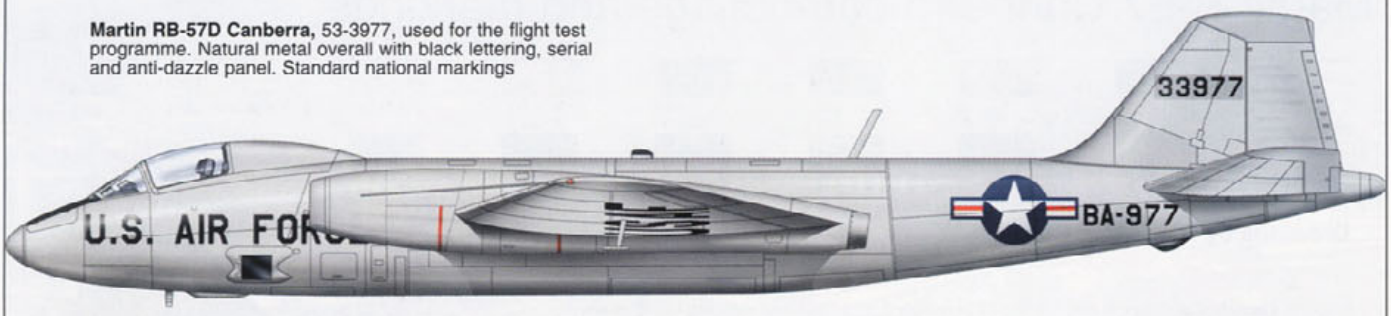
Martin RB-57A Canberra, 52-1456, 30th TRS, 66th TRW, Germany, 1956. Natural metal overall with yellow trim on fin, fuselage and wingtip tanks; white stars on yellow areas have a thin black outline. Note 30th TRS badge on forward fuselage. Standard national markings

Martin RB-57A Canberra, , 52-1474, 1st TRS, 10th TRW, Germany, 1957. Gloss Black overall with yellow fin/rudder decoration. Standard national markings; red lettering

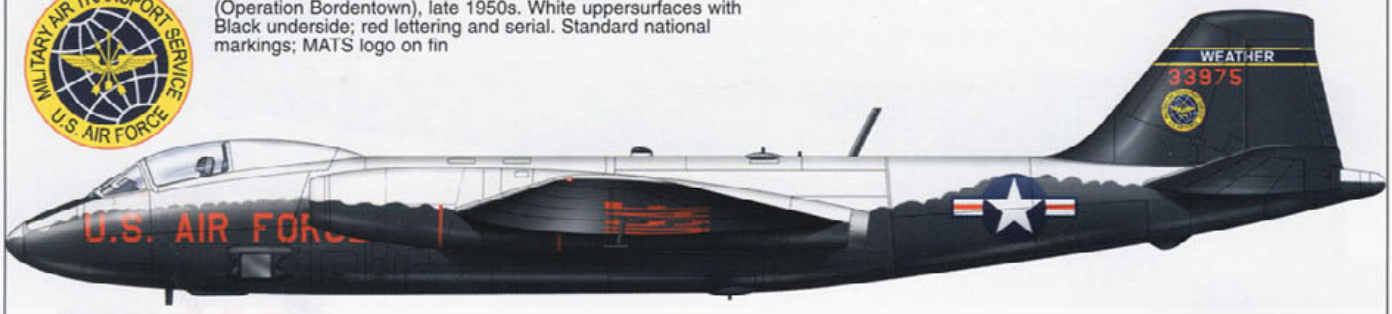
Martin RB-57A Canberra, 52-1427, Arkansas Air National Guard, 1961. Natural metal overall with black front section of engine cowlings, tip tanks and leading edge of fin. Yellow trim, outlined in white with red stars superimposed on nose section. '27' is repeated on wingtip tank in black. Standard national markings

Martin B-57B Canberra, 53-3826, 501st BS, 345th BW. Natural metal overall with Olive Drab anti-dazzle panel and black nose tip. Mid-blue flashes on fin/rudder and wingtip tank; lettering and serial in black. Standard national markings

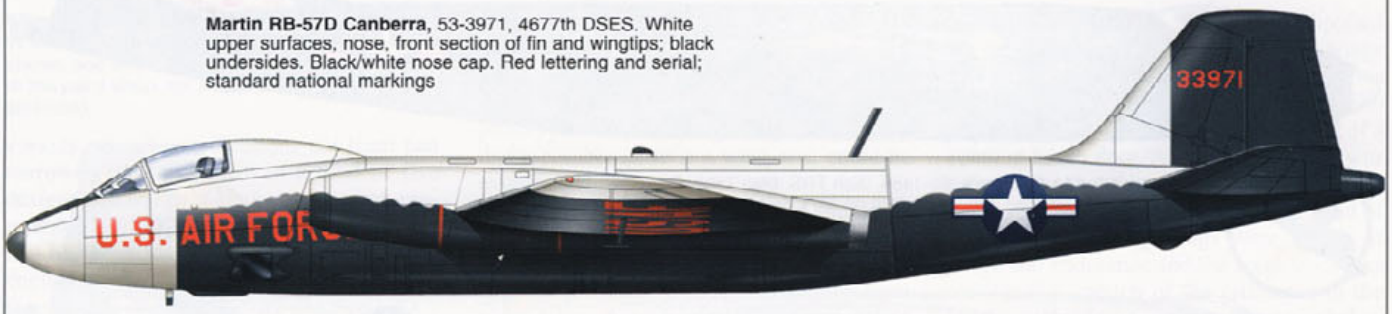
Martin RB-57D Canberra, 53-3977, used for the flight test programme. Natural metal overall with black lettering, serial and anti-dazzle panel. Standard national markings



Martin RB-57D Canberra, 53-3975, 4025th SRW, Frankfurt (Operation Bordentown), late 1950s. White uppersurfaces with Black underside; red lettering and serial. Standard national markings; MATS logo on fin



Martin RB-57D Canberra, 53-3971, 4677th DSES. White upper surfaces, nose, front section of fin and wingtips; black undersides. Black/white nose cap. Red lettering and serial; standard national markings



Complete with solid nose that replaced the original transparent one, this B-57A, 52-1424, has its undercarriage and flaps lowered in preparation for landing. (BBA archives)

ered twin engined bomber from mid-1945. Seen by the RAF as a replacement for the Mosquito the resultant E.3/45, later B.3/45, was intended to operate in the radar bombing role from high altitude.

The aircraft that finally rolled out on 2 May 1949 had undergone frequent design changes especially the wings which had first been envisaged as swept although this had soon been changed to a straight leading edge which reduced the difficulties of such a planform and allowed a reasonable fuel load to be carried. Engine location had also seen much refinement having first been fully buried in the wing before finally emerging in semi-nacelles standing proud above and below the surfaces. Engine choice was eventually whittled down to the Rolls Royce AJ65 engines which would later evolve into the Avon RA.1. Fuel was housed in tanks located in the fuselage underneath of which was the bomb bay capable of carrying up to 6,000 lbs of bombs. This location could also house an extra overload fuel tank.

The fuselage was circular in section with the crew being housed in the forward fuselage the pilot being seated under a bubble type canopy whilst the one, later two navi-

Martin B-57B, 55-4275:BA-275, of the 3rd Bomb Wing on final approach to Yokata Air Base. Although based in Japan the Wing carried out its nuclear alert duties in South Korea. (BBA Archives)

Some of the earliest B-57A Canberras rolled out at the Martin plant and awaiting delivery to the 10th TRW.

gators were seated under frangible hatches aft of his location. The undercarriage, flaps, bomb bay doors and the finger type air-brakes above and below the wings were all hydraulically powered by pumps driven via extensions from an engine gear box.

When Specification B.5/47 was issued by the Ministry of Supply in 1947 it added extras to the basic English Electric A.1 design the main of which was the installation of an ARI5829 G-H radar bombing system which would eventually be dropped as its development fell too far behind schedule. Its replacement was an extra crewman, a glazed nose cone and a bombsight. One item that did succeed in reaching the final design were the wingtip fuel tanks capable of holding 250 gallons.

The first A.1,VN799, undertook its first flight from English Electric's Warton base on 13 May 1949 with R. P. Beamont, the company's' chief test pilot, at the controls. Early test flights indicated that a redesign of the fin and rudder would be required as flutter and longitudinal instability problems were encountered. The modifications required a reduction in the size of the horn balance and a squaring off of the fin to increase the surface area. Once these modifications had been embodied the revamped aircraft was successfully displayed at that year's Farnborough SBAC show. Other displays during 1950 also showed off how agile the new bomber was.

The American team who had been keeping an eye on the Canberra since its inception finally arrived at Boscombe Down in August 1950 to have a closer look at VN850. A display of the aircraft's capabilities was requested which was flown by Beamont using the second prototype B. Mk.2, VX169, from the USAF Maintenance Facility at Burtonwood. Arriving on 17 August the Canberra was given a good look over by the American team before the display was flown. Further to this visit the Americans sent a team of test pilots to Warton in September to fly the Canberra. Reports after these flights indicated that the Americans were very impressed with the aircraft's performance thus a request was made for the Canberra to be flown off against the competition.

On 15 December 1950 the Pentagon appointed a committee led by Brig. Gen. S. P. Wright to evaluate the two final contenders, the Martin XB-51 and the EE Canberra. The committee suggested that although neither machine fully covered all aspects of the night intruder task it would be prudent for the USAF to purchase two operational Wings of each type for extensive evaluation. Obviously such extravagance was not viable, not even in an America pushing forward the boundaries of flight therefore HQ USAF postulated the idea that the Canberra was the better of the two. Although the British design was slower its other attributes, such as greater range and loiter time, more than compensated for this deficiency.

Only one more stumbling block needed to be overcome and that was the quantities required and the delivery schedule. Both were beyond the capabilities of English Electric who had already sub-contracted production to such firms as Avro, Handley Page and Shorts. To investigate this potential problem and begin the required steps for license production the USAF sent Lt. General K. B. Wolfe to the UK. The manufacturer and the British Government candidly admitted that such an order could not be tackled for many years therefore license build was the only option. The manufacturer recommended to carry out this contract was the Glenn L Martin Company as compensation should their own design, the XB-51, fail to be accepted by USAF.

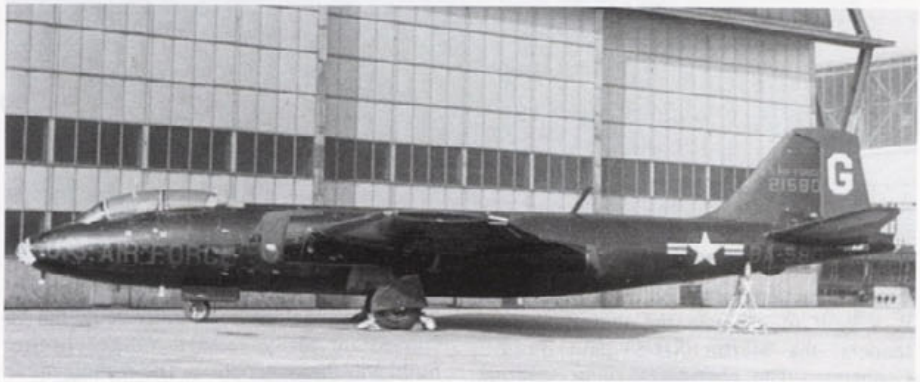
The decision having been made, arrangements were put in hand to fly two Canberra B.2 bombers to America so that the Glenn L Martin Aircraft Company could use them as pattern aircraft during license manufacture. The first airframe despatched from the UK was the fourth production B.2, WD932, which departed on 20 February 1951, routing via Aldergrove and Gander to reach the United States, the distance covered was 2,060 miles in a time of 4 hours 40 minutes. A few days later the British bomber, piloted byBeamont, was flown off against the Martin XB-51 in front of an invited audience at Andrews AFB, Washington DC, as expected the Canberra flew rings round the indigenous product.

On 2 March Air Material Command was directed to initiate Canberra production using Martin Aircraft in Baltimore as the primary contractor. Three days later the pattern Canberra was officially handed over to USAF and given the serial 51-17352 although this was never applied. The bomber was retained by the Martin Aircraft Company for performance verification, evaluation and trials work.

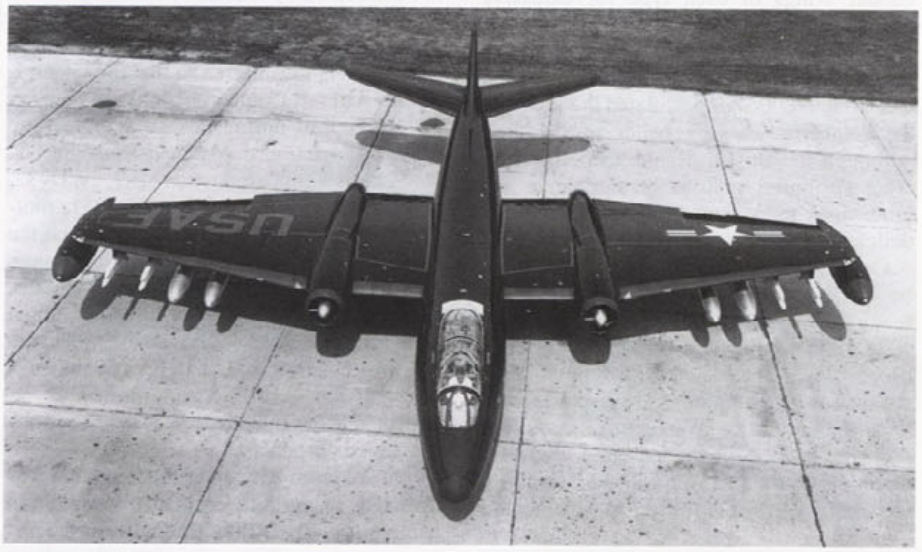
It was during its sojourn with Martin that this first aircraft was lost during a test flight on 21 December 1951. The accident report stated that the aircraft had disintegrated at 10,000 ft whilst undertaking a tight turn with the centre of gravity limits further aft than the design maximum due to incorrect man-

This three-quarter front view of a Kansas Air National Guard RB-57A reveals the extra aerials under the nose and the bomb door in a partially open position. (BBA archives)

Above: On the point of touch down at the Martin flight test facility at Middle River, this early production B-57 sports underwing pylons and the standard, all black, finish of the 1950s.



Above: Outside the maintenance hangar at Laon AB, France, this B-57B of the 38th TBG has a trestle under the rear fuselage to support the aircraft when the fuel load was minimal. Below: B-57B showing the variety of underwing stores that could be caried. These included rockets and in this case napalm tanks as well as the internal bomb bay (BBA Archives)



agement of the fuel system. The report concluded that the aircraft had became unstable during the pilot-initiated turn which became tighter and tighter until the forces generated caused the wing to fail just outboard of the port wing engine nacelle. As the aircraft fell apart the pilot ejected safely although the observer/navigator was killed while trying to escape.

A second pattern aircraft, WD940, the 12th production Canberra B.2, was flown out to the United States on 31 August 1951 after a flight that lasted 4 hours 18 minutes at an average speed of 481.1 mph being handed over to Martin on 4 September. Within twelve months the aircraft had acquired USAF insignia and a serial number, 51-17387, although the original RAF scheme of light grey upper surfaces and black underneath was retained. During its time at Martin Aircraft the bomber was used to continue the flight test programme later being employed on the underwing pylon trials. Its final contribution to the B-57 project was to trial the modified nose and canopy that would be such a distinctive feature of the 'B' model. After completing 33 hours of test flying the Canberra was grounded and used for spares reclamation. The cost to the US taxpayer for both these pattern aircraft was $1,001,061 which as subsequent events would show was money well spent.

To speed up the design and development process Martin sent a team of engineers to the UK in 1953 to familiarise themselves with the production methods practised by English Electric. After returning home these engineers formed the nucleus of the manufacturing teams that would eventually peak at 350 overall. By late July the Air Force Board of Inspection had approved the mock ups for hardware production. When production was finally instigated there were some changes to the methods used in construction as the American company preferred automatic riveting instead of the more manual methods favoured by English Electric. Although this method increased the weight of the airframe slightly it did reduce costs and production time. Further changes were made to the tolerances involved in the skinning which were given bigger clearances to enable faster construction. The other major change involved the manufacture of the main spar bulkhead which was built in one piece in the United Kingdom, but had to be made in two parts by Martin Aircraft as the forging capacity for such an item was not available in the United States. Eventually some 12,000 manufacturing tools were in the possession of Martin Aircraft while another 13,000 were out with sub contractors. Martin had sub-contracted certain parts of the aircraft to outside sources thus Kaiser Metal Products were responsible for the outer wing panels and the rotary bomb door, Hudson Motors built the rear fuselage plus the empennage and tail assembly while Cleveland Pneumatic Tools manufactured the landing gear. Kaiser would eventually lose the outer wing panel contract which left Martin to construct them in-house.

Other items passed out for sub-contracting included the engine nacelles, nose cone, canopy, the fuel cells, the tip tanks and the greater majority of the internal equipment. The remainder of the aircraft was built by Martin Aircraft in its Plant No.2 , the Middle River Facility, who carried out the final assembly and flight testing of each B-57.

MARTIN RB/B-57A

Contracts issued for B-57 production were placed in 1952 with the issuance of AF33 (038) -22617-FPI- FY1952 on 3 September 1953 long after production had actually begun. The original cost was set at $217,151,281,000 which covered a total of

177 airframes plus the two UK-built pattern aircraft which were costed at $901,061 with $100,000 worth of spares. Also included in the accounting were a mobile trainer and 103 special weapon bomb doors.

The maiden flight of the first B-57A, 52-1418, was undertaken on 20 July 1953 and lasted 46 minutes. Seen very much as a trials batch of aircraft only eight would be built, most ending their days designated as NB-57As. Changes from its British progenitor included the deletion of the starboard navigator window whilst the port one was moved slightly aft. The pitot probe was also relocated from the nose cone to a position under the nose whilst the bomb bay was shortened slightly. To cater for increased cooling requirements a single air intake was added under the engine intake lip. Flight testing of the first B-57A began on 20 August at the Middle River facility with the first aircraft being accepted by USAF that same day. Official testing of the B-57A did not begin until December 1953 by which time all this batch had been built and test flown under the auspices of Martin Aircraft.

In contrast a total of 67 RB-57As , Martin Model 272A, would be constructed, being serialled 52-1426 to 1492. This contract was not without its difficulties however as the initial USAF order had been for 99 aircraft although in typical airforce fashion it was reduced to 87 machines a few weeks later. To compound the difficulty facing Martin's there was a vocal faction that expressed a wish to cancel this version altogether and use the money to either upgrade the remaining Douglas B-26 Invaders to RB-26 standard or hold onto it for use in the same organisation's RB-66 Destroyer programme. Neither was really acceptable as the former was a non-starter and the latter would not join the USAF inventory until 1954 at the earliest. Eventually the contract would be finally settled at 67 RB-57As on 11 August 1952. To suit the aircraft for its role, mountings were provided that were capable of holding P-2, K-17, K-37, K-38 and T-17 cameras which enabled the RB-57A to carry out its mission in either day or night conditions. One proviso built into the specifica-

Above: Resplendent in an overall gloss black finish this Martin B-57B recalls the early days of the aircraft's service. The type was flown by the 134th DSES/158th DSEG of the Vermont ANG. (John Harris) Below: A B-57B releases its load of six iron bombs during a raid over North Vietnam.

Right: Wearing the 'Green Mountain Boys' titles on its underwing pods, this EB-57E of the Vermont ANG has a light grey and dayglo colour scheme. (John Harris) Below: An exact front view of an EB-57E shows the dayglo areas and the three aditional air intakes under the engines. (John Harris)

Martin B-57B Canberra, 52-1574/H, 71st BS, 38th BW, 1957. Gloss Black overall with red rudder. All lettering and serials in red; standard national markings. Unit badge is carried on a white square on fin; red/white lance, with white helmet on wingtip tank. 'H' is white; code BA-574 is red

Martin B-57B Canberra, 53-3862/I, 822nd BS, 38th BW. Gloss Black overall with red lettering and serial; yellow rudder with black 'I'. Note yellow falcon and white cloud decoration on wingtip tank. Standard national markings

Martin B-57B Canberra, 52-1525/C, 765th BS, 461st BG. Gloss Black overall with red lettering and serial; white 'C' and decorations on fin/rudder, and forward fuselage. Standard national markings

Martin B-57B Canberra, 52-1539/N, flown by the Commander of the 461st BG, Hill AFB. Gloss Black overall with white trim on wingtip tanks; white/red/yellow flashes on fin. White circle and 'N' on fin; all other lettering in red. Standard national markings

Martin B-57B Canberra, 53-3946, 498th BS, 345th BW. Gloss Black overall with red lettering and serials. Red flash on fin and rudder. Standard national markings

Martin B-57B Canberra, 53-3956, 499st BS, 345th BW. Gloss Black overall with red lettering and serials. Yellow flashes on wingtip tank and fin/rudder. Standard national markings

Martin B-57B Canberra, 52-1578, 38th TBG. Gloss Black overall with red lettering and serial; Orange decorations to nose, engine intakes, fin and elevator (top and bottom). Standard national markings

Wing over attack on a target far below this B-57E illustrates the way in which many Wings deployed their aircraft in Vietnam. Other attacks were made at low-level.

tion was the requirement that these aircraft could be converted for use as bombers although this course was very rarely, if ever undertaken.

The first flight of an RB-57A was undertaken in October 1953. Production would shudder to a halt a few months later as delivery of major components was delayed due to production problems with the sub-contractors. Adding another engine manufacturer, Wright, to the team, and removing construction of the wing panels from Kaiser Industries soon put the programme back on schedule. When the B-57 Canberra entered USAF service the local press made great play upon a supposed increase in overall speed over its British progenitor. Martin engineers had spent many hours sealing the gaps between the fixed and moving surfaces and decided that the modifications would give an increase in speed of some 30 knots. Further investigation of the results saw the increase reduce to five knots, the fault was later traced to a position error in the air speed indicator system. Consultation with their counterparts at English Electric revealed that the static part of the ASI system needed careful positioning and control exercising over manufacturing tolerances.

Once the ASI problem had been resolved corrected handling charts were inserted into the pilots notes. Overall the handling qualities of the B-57 were similar to that of the Canberra in that control was positive at all speeds down to the stall. Stalling speeds ranged from 130 knots, aircraft AUW at 53,400 lbs, undercarriage down and flaps retracted in take off mode, to 85 kts with AUW at 28,000 lbs, undercarriage down and flaps at 60 degrees deflection for landing. There were a couple of behavioural quirks associated with the B-57 one being the tendency to 'tuck under' close to Mach 0.88, the other being a tendency to pitch up sharply close to Mach 0.87. Modifications embodied throughout the fleet to correct this tendency to deviate also improved the aircraft's 'g' handling as the elevator forces were decreased throughout the full range of weights and Centre of Gravity positions. Before the embodiment of this modification the early B-57A pilots were warned to exercise extreme caution especially as this version was flown close to the aft C of G limit. This meant that the elevator control loads were extremely light thus an excess of movement could result in the total destruction of the aircraft. Other handling limitations applied to the B-57A revolved around the wingtip tanks which limited the airframe to a maximum 'never to exceed' speed of 444 kts. Without the tanks fitted the B-57 was limited to 513 kts.

Once the first aircraft began to roll off the Martin production lines USAF began to form operational wings to fly the type. However the first eight B-57As would never enter USAF service being retained for test, evaluation and development purposes thus the RB-57A would be the first version in service with the 363rd Tactical Reconnaissance Wing at Shaw AFB, South Carolina who would quickly decorate their new gloss black mounts with the unit's dis-

Close to the end of their service career the EB-57E fleet gained even more aerials under the fuselage. Belonging to the Vermont ANG this one has its air brakes extended as it comes into land (John Harris)

Martin B-57 Canberra production list

Model	Serial Numbers	Quantity
Canberra B.2 WD940	51-17352	1
Canberra B.2 WD932	51-17387	1
Contract AF33(038)-22617		
B-57A	52-1418 to 52-1425	8
RB-57A	52-1426 to 52-1492	67
B-57B	52-1493 to 52-1594	102
Contract AF33(600)-22208		
B-57C	53-3825 to 53-3858	34
B-57B	53-3859 to 53-3935	77
B-57C	53-3936	1
B-57B	53-5937 to 53-3939	3
B-57C	53-3940	1
B-57B	53-3941 to 53-3943	3
B-57C	53-3944	1
B-57B	53-3945 to 53-3947	3
B-57C	53-3948	1
B-57B	53-3949 to 53-3962	14
Contract AF33(600)-25825		
RB-57D	53-3963 to 53-3982	20
Contract AF33(600)-29645		
B-57E	55-4234 to 55-4301	68
Total		**403**

tinctive red and white chequerboard insignia. Before this event the first few aircraft were flown by the 345th Light Bomb Group based at Langley AFB, Virginia where they would be used to train crews destined to fly the definitive version, the B-57B. In Europe the RB-57A was operated by the 10th TRG based at Spangdahlem AB in Germany and the 66th TRG based at Laon AB, France. Outside America and Europe a handful of RB-57A's were operated by the 6021st TRS, later 6091st TRS, from Yokota AB, Japan After their front-line service the survivors were passed onto the Air National Guard.

The first operation that the B-57 was involved in was 'Exercise Sagebrush' which was undertaken during 1955. This was spread across the lower eastern part of the United States and involved over 800 aircraft. The premise behind 'Sagebrush' was that an enemy force would conduct a sneak attack to drop nuclear weapons and attempt to overrun a well established force. The first simulated attack was launched by the B-57s on 15 November. It was a one way fight as the Martin aircraft took out 18 of the defender bases. A similar scenario was enacted the next day when 19 were adjudged to have fallen. That night the B-57s rendered the remaining bases inoperable. The way the B-57s had been deployed had shown that a well flown high speed attack could disable any location which was using earlier outmoded tactics for defence. The aircraft used by the aggressor forces were drawn from the 461st BW and the 363rd TRW, both part of Tactical Air Command.

Having got off to a flying start the RB-57As soon began to encounter in-service

Left: A B-57B of the Air Research and Development Command (ARDC badge on fuselage) Air Force Flight Test Center badge on fin. Seen at Edwards AFB 1959 (Terrry Panapolis) Below: EB-57E, 55-4275:BA-275, of the 556th RS, 347th TFW, carries the tail code 'GT' of that unit when it was based at Yokota, Japan before moving to Kadena AB between 1971 and 1972

Above and right: Two pictures of the Black Knights display team belonging to the 38th TBG based at Laon, France. The difference is shown in the neater presentation of the colour scheme on the right from that initially used. (BBA archives)

problems. The first to arise concerned the Buick-built engines which had a tendency to burn oil and fill the cockpit with noxious smoke and fumes. Rectification of this problem was quite drastic as it required replacement of the Buick-built powerplants by those from Wright Aeronautical thus, throughout 1954 , there would be engineless complete B-57s sitting on the ramp at Middle River waiting to enter service.

Handling of the new type would also cause problems as attrition was quite high although much of this was due to the RB-57s pretending to be high-speed low-level bombers and colliding with the ground in the process. Whilst a re-evaluation of the Canberra's role within USAF was undertaken the fleet would spend much of 1955 sitting on the ground. Given these incidents it is hardly surprising that operational use of the RB-57A was relatively brief. The first unit to lose its Canberras was the European-based 10th TRW which traded in its aircraft for the Douglas RB-66B in April 1957, the remaining Wings following on until the final RB-57A left USAF service in November 1958.

One little known area of RB-57A operations concerns Project Lightweight, later Heartthrob, aircraft modified for high altitude reconnaissance. During 1955 conversion of ten machines was undertaken by Martin Aircraft under the guidance of the Wright Air Development Centre. To fit the Canberra for this role all excess reconnaissance equipment was removed as was the bomb bay door, the whole area being reskinned. The navigator's position was also eliminated thus the pilot, the only occupant, required an optical viewfinder to carry out

Below: Starting the B-57 was a smoky and messy business as this picture shows. Eventually a cleaner cartridge was developed. The 'X' symbol on the fin and wings indicate that this was an exercise participant, the aircraft actually belonging to the 38th TBG based at Laon, France. (John Harris)

Martin B-57 Tail Codes

Tail code	From 1967	Variant in use
PQ	8th TBS, 405th TFW then 35th TFW	B-57B
PV	13th TBS, 405th TFW	B-57B
FK	13th TBS, 8th TFW	B-57G
FS	4424th CCTW, 15th TFW, then 1st TFW	B-57G
GT	556th RS, 347th TFW	EB-57E
JM	4461st TEWS, 363rd TRW was 4416th CCTS	EB-57E
JO	22nd TRS later 62nd TRS, 363rd TRW	B-57E

the aircraft's tasks. Also removed was the clear nose cone which was covered by an opaque fibre glass replacement which retained a small window for the viewfinder, all these changes reduced the basic weight by 5,665 lbs and increased the operational ceiling by 5,000 feet. To power this conversion to greater heights the original J65-BW-5 engines were replaced by higher thrust J65-W-7's. In its new guise the Canberra was redesignated as the RB-57A-1.

Of the ten aircraft converted six went to the 7499th Composite Squadron of USAFE whilst the remainder left for the Far East where they were operated by the 6007th Composite Squadron. Even today their missions are shrouded in secrecy although it has been reported that at least one was shot down by a surface-to-air missile whilst observing the Hungarian uprising in 1956.

From USAF the retired aircraft were given to the Air National Guard whose 117th TRS, 154th TRS, 165th TRS and 172nd TRS would enter the inventories of the Kansas, Arkansas, Kentucky and Michigan ANG's respectively. During their period with the ANG the Canberras were placed on alert a few times although no deployments would ever result in response to these international crisis. Their primary task appears to have been in support of the various state local authorities during natural disasters where the reconnaissance capability was much appreciated in the destructive aftermath of a hurricane or tornado. Most of the ANG units would trade in their RB-57As during 1965 for the RF-101 Voodoo although the 172nd TRS really underwent a total change of roles when it replaced its big jets with the Cessna O-2A observation aircraft.

One final use would be found for redundant RB-57As, that of electronic spoofs, a programme that got underway in 1959. For this role Martin would refit the aircraft to carry ECM equipment in the bomb bay which was initially powered by a pair of air driven generators in the bomb bay. Later these would be replaced by a pair of Sundstrand constant speed AC generators for which an enlarged scoop intake would be mounted below the engine nacelle lip. The pylons under the wings would now be home to a set of chaff dispensers whilst the navigator would be replaced by an Electronic Warfare Officer. In its new guise the Canberra was designated the EB-57A and would be operated by the 4713rd, 4758th and 4677th DSES. Operational use of this version would continue until all had been withdrawn from service by 1973 having been replaced by reworked EB-57B/E aircraft.

Parked in its revetment at Tan Son Nuht AB this RB-57E has its nose hatch open for access to the camera array. Given that most of their mission requirements were at night it is not surprising that the overall colour scheme was matt black. (John Harris)

MARTIN B-57B

With the RB-57A safely in service development began on the next stage of the Canberra. Design work began in early 1952 under the aegis of Air Material and Air Research and Development Commands who presented their findings upon the early versions in March. With the changes embodied into the mock up by Martin production was approved on 11 August 1952. The follow on contract, AF33 (600)-22208-FPI-FY1953, was approved on 4 November 1953. The set cost for this contract was $114,119,575 which covered a total of 191 B-57Bs. Included in the price were the special weapons doors, spare parts, technical training and development work. This contract was later revised in June 1955 to cover 38 B-57C trainers and 120 B-57B bombers with 138 bomb doors. The bomber version buy was further reduced by 20 aircraft, the deleted machines being earmarked for the production of B-57D programme airframes. The final total for this contract eventually reached $115,477,008.

In comparison with the earlier B/RB-57A the new bomber had undergone some radical changes the most obvious of which was a completely reconfigured nose section. Gone was the bubble canopy to be replaced by a single-piece hinged unit. This faced up against a whole new windscreen assembly which came complete with a flat front panel which allowed for the installation of a gunsight. The new nose allowed the crew to sit in tandem, although the navigator, in the rear seat, was slightly offset to the left to allow for installation of a SHORAN receiver indicator and an M-1 toss bomb computer unit. Other changes allowed for the mounting of four underwing pylons whilst the single piece bomb door, 17 feet in length, was located under the fuselage. To assist the crew in carrying out accurate bombing runs an APW-11 Bombing Air Radar Guidance System was installed whilst an APS-54 radar warning system was fitted allowing the crew some warning of hostile AI radar illumination. As a weapons platform the B-57 could deliver its bomb load using two methods, the first was manually over known preprogrammed co-ordinates or automatically using the SHORAN navigation computer. Release was under the control of either the pilot or the navigator although the pilot had the final control over the specific weapon used and the release sequence. When the bombing run began the rotary bomb door rolled open just before the drop point. Over the target the door span opened in four seconds, released the selected bombs then rolled shut in under six seconds. The door itself was divided into three zones for loading purposes each of which had seven stations. A further extra was a pair of bomb

Further modifications introduced in the B-57B included speed brakes or boards mounted on the rear fuselage. These had been found necessary to improve low speed handling as the wing finger brakes were not effective enough. An added benefit found later in combat was that the speed brakes when deployed helped control the aircraft during diving passes in the ground attack role. Further features incorporated in the B-57B were improved anti-icing systems in the wings and engine inlets plus anti-skid brakes, a brake parachute for use in short landings and power boosted control surfaces to improve handling.

Armament improvements also encompassed the installation of forward-firing guns in the outer wing panels. Initially these consisted of eight 0.5 inch machine guns in batches of four with 300 rounds per wing group. This armament only continued up to the 93rd airframe before the installation changed to four M-39 20mm cannon, two per wing. To improve accuracy the weapons were canted downwards by 3.5 degrees from the aircraft centre line. The rearrangement of the wing armament allowed each weapon to have 290 rounds available per gun. Unfortunately it was not possible to convert the earlier aircraft to carry the cannon armament as the wing structural changes were too radical to alter without a major rebuild.

Service entry of the B-57B began with the 345th Bomb Group (Tactical) which received its first gloss black aircraft in 1955. In the subsequent two years, three further

Above: RB-57A, 52-1459, was passed on to the Michigan ANG. It is seen at home base, Battle Creek ANGB complete with a sunshade over the cockpit (BBA Archive) Below: Martin B-57B, 53-3826, was part of the 345th BW at Langley AFB. By the time this photograph was taken the original black scheme had been removed leaving the aircraft in natural metal finish (BBA Archive)

Last resting place for one of the six RB-57Es converted to the 'Patricia Lynn' standard for specialised photo-reconnaisance work over Vietnam. They were operated by the 460th Tactical Reconnaissance Wing from Tan Son Nhut and were fitted with a variety of cameras for work both day and night. All were eventually to end up in the AMARC storage facility.

weeks due to the primitive conditions encountered.

Although the B-57B was a vast improvement on the earlier RB-57A it too was briefly grounded due to toxic fumes in the cockpit which was eventually traced to a defect in the design of the engine compressor. Once modifications had been embodied the fleet resumed normal operations. Outside of these various machinations the B-57 crews settled down to a life of training for a war that all hoped would never happen. This idyllic way of life was rudely shattered in May 1956 by a series of unexplained crashes. The fault was traced to the tailplane trim actuator which had a tendency to run-away to the nose down position in the event of an electrical fault or spurious input caused by stray voltages. Resolution of this fault required the installation of an emergency switch and position indicator in a prominent position in the front cockpit. Training was also given to pilots so that they could recognise these symptoms before they became fatal and cancel the trim jack actuators movement by cutting the power. Further modifications applied to the B-57B/C and E saw the installation of power actuators to the rudder to improve handling and the fitment of Douglas ESCAPAC zero/zero rocket pack seats in place of the earlier cartridge ballistic type. Tactical Air Command would retain two B-57 wings in service these being the 461st and 345th BW, the former would disband on 1 April 1958 while the latter disbanded on 25 June 1959. With the disappearance of the bombers from TAC the command was left with only one operational unit which was a target towing unit equipped with the B-57E which remained active until June 1962

B-57E, 53-3898, was part of the 8th TBS based at Ubon and seen in March 1969. The aircraft is in one of the many prefabricated shelters built to protect aircraft from Viet Cong ground attack. (via Terry Panopalis)

Once the new B-57 crews had completed their conversion course they were directed to Warner Robbins AFB where they would pick up their new mounts. Those aircraft destined for Japan routed via McClellan and Hickam AFBs before touching down at Johnson AFB, later renamed Iruma AB, later Headquarters of the JASDF. The most difficult leg in this transit flight was that to Hickam AFB, Hawaii which required that overload tanks be fitted in the bomb bay. Take off was slated for the cool of early morning thus wringing every ounce of energy from the fuel load. Even so it was not unknown for aircraft to suffer a double engine flame out on touch down. Fortunately only one aircraft was lost during transit this being 53-3916 which suffered a fuel system malfunction on 12 May 1952. In the event the crew ejected being picked up by one of the picket ships strung along the route. In contrast the trip to Europe was fairly easy transiting via Canada and Iceland before touching down in France. It was in France that the only B-57 acrobatic team would be formed, this being the 'Black Knights' of the 38th BG(T). Their existence was short-lived as higher command thought that such aerial gyrations were the province of the far flashier and noisier fighters of the day.

MARTIN B-57C

Deducted from part of the B-57B contract the B-57C was a dual control version of the bomber which differed from the 'B' by having extra instrumentation and flight controls in the rear cockpit.

First flight of a production B-57C was undertaken on 30 December 1954 with initial deliveries of four aircraft being made to Air Training Command to assist in the initial B-57B conversion and training programme. The B-57C began to enter service in 1954 when the 3510th CCTW based at Randolph AFB gained its first machines in November. The facilitates offered by the Combat Crew Training Wing were used by the final Groups to form, the 345th having been

Amidst the clouds EB-57B, 21526, was being flown by a crew from the 117 DSES, 190 DSEG ANG but no unit markings appear and the aircraft is in the standard light grey and dayglo scheme used when the picture was taken in June 1978. (via Terry Panopalis)

responsible for its own operational work up with assistance from Martin Aircraft personnel. The two overseas units used the crew training course as a means of conversion and for ferrying the new bombers to their final destinations. Although most of the 38 produced were allocated to operational units a handful were later converted to RB-57C standard for use by Air National Guard units.

MARTIN RB-57D

A third contract AF33 (600)-25825-CPFF-FY1953 was the paperwork issued to cover the convoluted production of the RB-57D series. The final published total for this relatively small production run was some $60

Above: Seen in South-East Asia markings this RB-57E undergoing line maintenance at Shaw AFB belonged to the 62nd TRS, 363rd TRW. (Don Jay) Below: An unusual line up showing 22 B-57Es of the 405th TFW whilst based in Viet Nam. All are in natural metal finish and have a diagonal fuselage band aft of the wing trailing edge. (via Terry Panopalis)

Originally built as an RB-57A, 52-1448, later joined the Weather Reporting Service for which it had sampling pods attached to the positions normally occupied by the wing tip fuel tanks. It is not known whether this version was ever designated as a WB-57A. (BBA Archives)

million. As the B-57 was such a stable design it should come as no surprise that the airframe would be further developed. The first of these new versions would be designated the B-57D for high altitude reconnaissance. Commissioning came after a design study from the Wright Aeronautical Laboratory had recommended the acquisition of such an aircraft, the 'D' version would require more powerful engines and wings of an increased span. Martin Aircraft were issued with a letter of intent to produce 20 of these aircraft on 29 June 1953 utilising airframes drawn from a cancelled B-57B order. Given the requirement specifications of a range of 2,000 miles and an altitude of 65,000 ft it was accepted that subsonic performance would be adequate as would the lack of defensive armament. The whole secrecy shrouded programme was known as weapons system MX-2147 and was codenamed 'Bald Eagle'. Prior to Martin being granted the contract it had beaten off competition from Bell and Fairchild all three organisations being given development contracts on 1 July 1953. By March 1954 only Bell and Martin were in the competition the former developing its design as the X-16. The Bell machine was seen as the desired machine, but given its more advanced swept wing design the RD-57D was to be pursued in the interim.

Originally designated as the Model 294 the engineers at Martin not only studied the configuration of the revamped airframe but were also heavily involved in the selection of the equipment necessary to satisfy radar reconnaissance, photo reconnaissance and electronic ferret missions. A full blown production contract was issued to Martin on 4 February 1955 for the manufacture of 14 B-57D aircraft. All would be different thus new model numbers were issued. One aircraft was designated the Model 796, seven would appear as Model 744 whilst the final six would appear as Model 797 machines. It should be noted that to shroud the real purpose of these aircraft the bomber designation was retained although these aircraft would be incapable of such a mission.

This was definitely a contract that was forever changing as a revised version was issued to Martin on 29 March which had provision for only six machines at a cost of $18,825,780. Thus the original 20 had reduced to 14 then to six. Just to make things interesting a further confirmation contract arrived at Martin's on 21 December 1955 which increased the requirement to seven aircraft at an increased cost of $6 million. By this time the first B-57D had flown, undertaken test flying and been accepted by USAF. The revised version of this contract was superseded by a further update which not only increased the total build to the original 20, but revealed the true purpose of the type by designating them as RB-57Ds. Also in this contract was a clause for the development of six airborne ELINT systems which brought the final bill close to the $60 million mark.

The first flight of an RB-57D was undertaken in November 1955 being accepted by USAF soon afterwards, the final machine was accepted in March 1957 all 20 being notated for use as testbeds for the J-57 programme. The production break down for the RB-57D included six aircraft in the first batch, designated Model 294, a second batch incorporated an in flight refueling system and encompassed a total of seven airframes. These aircraft were followed by the single RB-57D-1 which not only retained the earlier single-man crew and in-flight refuelling system, but featured improved reconnaissance systems, the details of which are still largely classified. The final batch of aircraft, the Martin Model 797, were designated as RB-57D-2s by USAF and had the crew complement increased to two.

Technically the RB-57Ds were based upon a much modified B-57B fuselage which had lost its bomb bay and its fuselage fuel tanks. The camera installation was placed behind four windows forward of the nose wheel bay. Extensions to the fuselage were courtesy of radomes at both extremities which housed various avionics packages. To assist in controlling the aircraft full power controls were added to the rudder and a powered yaw damper was installed. The wing control surfaces were also drastically altered being confined to wing spoilers that operated in conjunction with the short span ailerons. As the

Tail code 'PQ' was allocated to aircraft of the 8th TBS of the 35th TFW based at Phan Rang AB. This one has the typical markings and finish of the period and carries napalm tanks under the wings. (Mark De Witt)

Martin B-57B Canberra, 53-3882/P, 405th TFW, PACAF. Natural metal overall with yellow nose tip, fuselage band and aircraft letter 'P' on fin; black lettering, serials and anti-dazzle panel. Standard national markings

Martin B-57B Canberra, 53-3903/T, 13th TBS, 405th TFW, PACAF. Natural metal overall with black lettering, serial and anti-dazzle panel; red nose tip, fuselage band and 'T' on fin (the latter thinly outlined in black). Standard national markings

Martin B-57B Canberra, 52-1567, South Vietnamese Air Force, Da Nang, October 1965. Natural metal overall with black serial, code, wingtip tanks and anti-dazzle panel; red nose tip and fuselage band. Note previous USAF lettering on nose and PACAF badge on fin partly visible

Martin B-57B Canberra, 52-1567/PV, 13th TBS, 35th TFW. Dark Green (FS.34012), Mid-Green (FS.34102) and Tan (FS.30219) uppersurfaces; Black undersides. White code and serial with black AF-021. Red rudder; black canopy framing

Martin B-57B Canberra, 52-1551, 165th TRS, 123rd TRG, Kentucky Air National Guard. Natural metal overall with red rudder top; Insignia Blue 'USAF' title on nose. Serial and code in black; ANG badge on fin. Standard national markings

Martin EB-57B Canberra, 52-1499, 134th DSES, 158th DSEG, Vermont Air National Guard. Light Gray overall with Orange Red nose, wingtips, outer face of wingtip tank, rear fuselage and fin; black nose, anti-dazzle panel, cockpit framing, inner face of wingtip tanks, lettering and serial. Outstanding Unit Award ribbon and ANG badge on rudder; standard national markings. 'The Green Mountain Boys' in Forest Green on underwing tank

Martin EB-57B Canberra, 52-1509, 117th DSES, 190th DSEG, Kansas Air National Guard. Light Gray overall with Orange Red nose, wingtips, wingtip tanks, rear fuselage and fin; black lettering, serial, anti-dazzle panel and cockpit framing. Standard national markings; note 'Kansas' in black with an Orange Red flash on underwing tank

Follwing the coast line this EB-57B shows the number of extra aerials in the area of the bomb bay connected with its role of electronic counter measures. (via Terry Panapolis)

handling of the RB-57D was substantially different from the standard bomber it was felt that the wing and fuselage speed brakes could be safely dispensed with thus reducing the type's all up weight. All the 'D' models shared certain characteristics, all were powered by a pair of Pratt and Whitney J57-PW-27 turbojets housed in enlarged nacelles each of which was capable of generating 10,500 lbs.st at sea level. As the RB-57D was required to fly at great altitudes special efforts were made to develop a reliable anti-icing system for the engines and airframe. Fuel load for this particular version was increased to 2,740 US gallons contained in the wings.

These too had undergone a major revision being increased in span to 106 feet with an area of 1,505 sq.ft. Both of these modifications would cause trouble for USAF crews in the early days. The combination of increased engine power and wings of greater area meant that it was relatively easy to overstress the airframe thus causing wing failure. Eventually the USAF pilots learned how to control these overpowered sprightly gliders optimised for high altitude duties. Instead of full throttle take offs the setting was limited to give a maximum take off speed of 106 kts. At this setting the rudder retained full authority and still allowed the RB-57D to take off using 2,000 ft of runway, it also meant that the aircraft could still be controlled should an engine fail. Climb angle was held at 25 degrees, thus an altitude of 50,000 feet could be reached some 15 minutes later. Maximum speed was limited to 190 kts therefore most phases of flight including climb, cruise and letdown were flown at 180 kts.

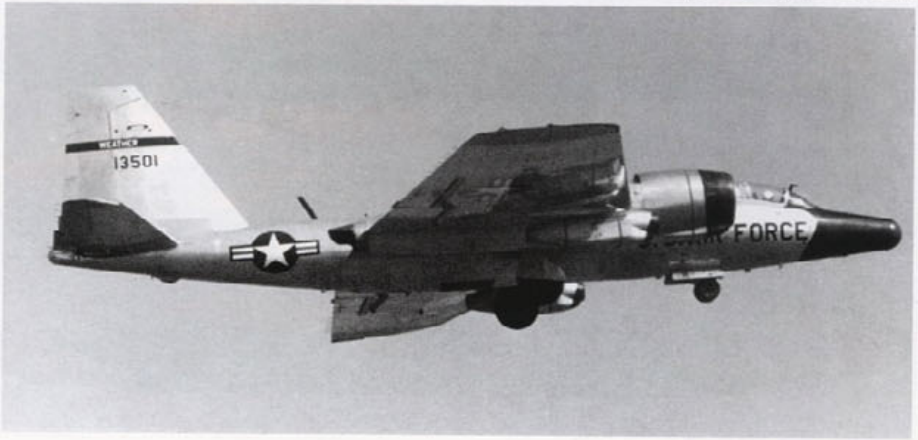
Given the height these aircraft regularly flew at it is not surprising that the pilots wore MC-3 pressure suits which protected them above 50,000 ft. However these suits were vulnerable to failure should they become contaminated with oil thus care had to be taken until a new resistant suit could be developed. Endurance of the RB-57D was some 5.5 hours without flight refuelling. At the end of any flight the landing was a long drawn out affair which began 70 miles out from base. Such an approach was needed as the RB-57D lacked fuselage air brakes thus it relied upon the drag induced by the extended undercarriage and wing spoilers to slow the approach. Even so speed remained around the 180 kts mark although this was reduced to 120 kts just before touchdown. This final act could be a long drawn out affair as the RB-57D had a tendency to float due to ground effect under the wings.

There were three distinct versions of the RB-57D. The first six, known as dash zero, were built as single-seaters and carried a pair each of K-38 and KC-1 split vertical cameras. The next version consisted of seven airframes which were similar to the preceding six, differing only in having an in-flight refuelling capability. The next six machines were designated dash one and carried two crew. Their role was that of ELINT therefore the cameras were deleted being replaced by electronic systems instead. Also fitted to this version was an AN/APA-69A radar system whose scanner was housed in a radome under the belly. Other radomes were often fitted at the wingtip for their nefarious missions and they too were capable of in-flight refuelling. The final version was also designated the dash one. This machine reverted to a single person crew and was equipped with an AN/APQ-56 high-resolution side-looking radar for all weather reconnaissance. The nose radome contained an AN/APN-107(XY-1) antenna. Further systems were installed in the extended radome at the rear of the aircraft. Other long radomes were faired into the centre fuselage under the wing roots.

Deliveries began to the 4028th SRS/4080th SRW, part of Strategic Air Command, at Turner AFB, Georgia, in April 1956 after the type's maiden flight had been undertaken on 3 November 1955. When fully operational the RB-57Ds moved to their new base at Laughlin AFB, Texas from where they undertook detachments to Yokota AB, Japan for reconnaissance missions along the Chinese and Russian borders. The deployed Canberras were part of the Group 'A' version and operated their sorties under the 'Black Night' codename. Operating alongside the long wing Canberras were the RB-57As of the 6021st SRS whose machines were also fitted with the higher powered 'Heart Throb' J-57 engines as fitted to their long wing siblings.

In Europe Rhein Main was the temporary home for four Group 'B' aircraft whose task was also to keep an eye on the forces of the Soviet Union. In 1959 a fifth machine, an RB-57D-1, joined the other four the whole detachment being designated as the 7404th Support Squadron better known as 'Project Big Safari'. In common with all such detachments security was high thus very little was, and is, known about their missions.

In 1958 the CIA began a project known as



Out of the variants of the B-57 that were modified for weather observations the most unusual was the RB-57F. This one was operated by the 7404th SS based at Rhein-Main, Germany. (MAP)

Displaying the tail code FK of the 13th TBS, 8th TFW this B-57G, 21578, rests in its Ubon revetment whilst undergoing maintenance between sorties. (MAP)

'Diamond Lil' which involved Chinese Nationalist pilots being trained to fly the RB-57D. Operations began in 1959 after three machines had been flown to Taiwan. After their withdrawal the Canberra's were replaced by Lockheed U-2s.

During their period in service nine of the fleet underwent modification work at Martin Aircraft to improve structural strength of the wing as they were subject to frequent failures. At least two failures occurred upon landing which led to frequent groundings. The Martin developed honeycomb was also subject to damage due to flight generated stresses and water seepage. Problems were also encountered with the Westinghouse auto pilot and other complex electronic systems all of which required careful nursing at times. The problem with wing failures meant that SAC would place at least four machines in temporary storage during 1959. This action was followed by the deactivation of the 4025th SRS in June its aircraft being assigned to the 7407th Support Squadron which still carried out some SIGINT/ELINT tasks.

A further four machines were used as a basis for the grotesque RB-57F aircraft which featured even longer wings. After serving in the reconnaissance role the remaining RB-57Ds were placed in storage at Davis-Montham AFB as they had exceeded their intended 500 hour design life. A further role would be found for the RB-57Ds which, after structural strengthening, would be assigned to the 4677th Defence Systems Evaluation Squadron, part of Aerospace Defence Command, based at Hill AFB, Utah. In their new guise their role was that of high altitude radar fakers. At its height this unit would operate 12 RB-57Ds and 30 EB-57Es. Even this role would eventually end and the remaining few machines would end their days in storage at AMARC, Davis-Montham AFB, Arizona.

The other role assigned to the RB-57D was that of air sampling especially after the explosion of nuclear weapons. The first instance of the RB-57D carrying out this duty was during 'Operation Hardback' in 1958 when aircraft from Group 'A' and 'B' sampled the air over Eniwetok Atoll after the detonation of a nuclear device. For this purpose three aircraft were converted to WB-57Ds and were operated by the 1211th Test Squadron (Sampling) a unit whose home base was at Kirtland AFB, New Mexico as part of the USAF Weather Service. Four years later the RB-57Ds were engaged in similar duties when 'Project Dominic' was initiated. Although dogged by controversy throughout its career the RB-57D did fulfil a much needed reconnaissance requirement which would finally end in the early 1970s when the final survivors were withdrawn. Only one machine would survive, 53-3982, the remainder being scrapped.

Although no more new airframes were to be built by Martin after 1957 there would be further contracts issued that would cover the conversion and modification of various airframes for numerous tasks. As an example Martin Aircraft was awarded a $2 million contract to modify and upgrade nine of the surviving RB-57Ds to extend their service life by another eight years although their withdrawal dates indicate that USAF did not quite get its money's worth. A further contract valued at over $10 million included upgrades for the RB-57D fleet and extensive modifications to a total of 51 B/RB-57A aircraft which required the installation of ECM

The B-57 had a number of different roles after its front line service was completed. One was target towing. These two B-57Es show the type of flag target displayed though when in use by aspiring young jet fighter pilots it was deployed much further away from the towing aircraft! (via Terry Panopalis)

Above: WB-57D 53-3839 was one three aircraft assigned to the 1211st Test Squadron (Sampling) to take measurements after the detonation of a nuclear device over Eniwetok Atoll in the Pacific. They appeared in the markings of the US Weather Service and home based at Kirtland AB, New Mexico. Below: The only unit to have the rare WB-57C was the 58th WRS based at Kirtland AB between 1963 and 1974. (via Terry Panapolis)

equipment for use in training missions. Managing the B-57 fleet was the responsibility of the Warner Robins Air Material Area based at Robins AFB, Georgia. WRAMA planned all the work required for the fleet which included overhauls of engines, airframes, electrics and avionics as well as any major modification programmes and repairs that were above field level capability. Support was also supplied world-wide by specialist teams despatched as and when required.

MARTIN B-57E

The final contract issued to Martin Aircraft was AF33(600)-29645 -FPI-FY1955 covering the production of the B-57E version at a total cost of $58,210,073. Overall the fourth contract reached a grand total of $510,572,148 which paid for 403 aircraft. Known as the 'Cadillac' of the Canberra fleet the Martin B-57E was intended to replace the surviving B-26 Invader and B-45 Tornado aircraft that were still employed in the target towing role. The requirement for this version was passed to Martin on 16 March 1954 with production go ahead being confirmed in January of the following year.

Although based on the B-57B the new version had undergone some modifications to suit it for its new role. The bomb door was found to be the most suitable place to mount the target tow winches although these had to be armour plated to protect the adjacent fuel tanks from damage by a flailing sheared cable. To ensure that the bomb bay could not be opened in flight the mechanism was disabled although removal by winches was possible on the ground. To mount the banners for tyro pilots to shoot at, the tail cone was redesigned. Two faired canisters were mounted under the extreme rear fuselage to house the banners, there being stowage for four, each being connected to a separate winch reel. Other changes were less obvious, the main of these being a hydraulically powered rudder which improved handling when target towing, others included a deeper tail bumper and two large rotating anti-collision beacons to warn over enthusiastic pilots of the B-57Es presence.

As before the front seat was occupied by the pilot however the rear seat was home to the target towing operator whose equipment replaced the SHORAN control panels. Although the B-57E carried no fixed armament or bomb mountings both could be added without much difficulty as could the SHORAN system, thus the 'E' could be returned to active duty status.

The first production B-57E made its maiden flight on 16 May 1956 with the last being delivered to USAF in March 1957. The greater majority of the aircraft built were delivered to Air Defence Command although a handful were diverted to the Air Force Flight Test School for various trials. The first unit to become operational with the B-57E was the 17th Tactical Training Squadron based at Yuma AFB, Arizona although its tenure here was short-lived as the squadron later moved en masse to MacDill AFB, Florida. Following the 17th into service was the 3rd TTS at George AFB, California whilst the 1st TTS formed at Biggs AFB, Texas and the more long winded 4756th TTS was formed at Tyndall AFB, Florida. Overseas six B-57Es were delivered to Johnson AB in Japan where they were operated by the 6th TTS which remained operative until late 1957 when its aircraft were reassigned to the care of the 8th BS of the 3rd Bomb Wing at the same base. European units were served by aircraft based at Wheelus AB near Tripoli, Libya. This remote location allowed visiting aircraft to undertake live firing exercises, a scenario not possible in crowded skies over Europe.

Operationally the B-57E was cleared to fly at altitudes above 40,000 feet which made for more realistic combat training than had been possible with the earlier incumbents. To further aid their recognition the upper

Rebuilt from an RB-57D by General Dynamics this WB-57F was usd for high altitude sampling. Re-engined with Pratt & Whitney TF33-PW-11A engines and auxiliary underwing P & W J60-PW-9 pods it was one of 17 redundant bombers to be converted. (via Terry Panapolis)

surfaces of the B-57E were painted international orange whilst the remainder of the airframe was finished in silver. This dramatic scheme plus the large red anti-collision beacons were deemed enough to warn pilots of the aircraft's location although they were not immune to the results of the odd stray projectile.

Once airborne in the designated part of the sky the target banners would be deployed. To launch a target the cable attached to the drogue was retracted enough to pull the banner clear of its canister under the fuselage. Once clear it would be winched out to a maximum extension of 5,000 feet being unfurled by the airflow along the way. The first combat types to use the services of the B-57E included the F-86D Sabre, F-94C Starfire and the Northrop F-89D Scorpion all of whom launched salvoes of 2.75 ins Mighty Mouse unguided rockets at the hapless banner. As an added safety precaution clearance to fire was not given until the tow aircraft's pilot was satisfied that the fighter would hit the banner, not the aircraft. Once the firing was over and the fighters had

The giant bat-like wing of the WB-57F shows well in this picture. The aircraft had no flaps and took an approach of over 10 miles to make a safe landing. (via Terry Panapolis)

Martin B-57G conversions

52-1578	53-3886
52-1580	53-3889
52-1582	53-3898
52-1588	53-3905
53-3860	53-3906
53-3865	533928
53-3877	53-3929
53-3878	53-3931

departed a chase plane would fly alongside the B-57E to count the scores. Once completed the banner was reeled in close to the aircraft where hydraulic cutters would sever it allowing the redundant item to drop clear of the airframe into a designated drop zone. With the old banner clear another could then be deployed allowing the exercise to resume. Although the B-57E could launch a total of four banners experience revealed that there was in reality only time to deploy two in a typical mission profile thus the extra two reels were removed to save weight.

With the arrival of the next generation of fighters armed with radar guided or heat seeking missiles the B-57E was deemed redundant and a new role had to be found for it. This would be in the ECM spoof role where the redesignated EB-57E would replace the earlier EB-57A machines. Therefore during the 1960s the B-57Es were fitted with a completely new electronics suite for their new role and Defense Systems Evaluation Squadrons were formed to operate the conversions.

Included in their ranks was the 4713rd DSES which was originally formed at Stewart AFB before moving to Otis AFB. This unit would eventually settle at Westover AFB. Whilst in existence the squadron provided the electronic attack element to USAFE units in Europe as well as the United States. Assisting the 4713rd in this role were 4677th DSES initially based at Hill AFB, Utah before finally settling at Malmstron AFB, Montana. During 1974 there would be a radical shake up amongst the DSES units with the 4713rd being disbanded. Its aircraft were passed onto two ANG units namely the 190th DSEG of the Kansas ANG and the 158th DSEG of the Vermont ANG. Following on from this move the 4677th DSES was redesignated the 17th DSES a title it retained until disbanding in July 1979 making it the last unit to fly the Canberra in frontline USAF service. The honour of bowing out the Canberra with ANG fell to the renamed 15th DSES of the Vermont ANG which finally retired its 'Cadillacs' in 1982.

MARTIN WB/RB-57F

One of the most rebuilt versions of the B-57 was the General Dynamics WB-57F which was remanufactured to meet a requirement for a high altitude sampling aircraft. Designated 'Project Peewee' the contract was awarded to General Dynamics, Fort Worth in October 1963. Initially aimed at rebuilding only two airframes, the programme eventually covered 21 airframes. Providing the basis for these rebuilds were

The markings on the underwing tanks indicate that this EB-57B belonged to the 134th DSES, Vermont ANG. Notice the different nose dayglo markings compared to the aircraft from the same unit seen below. (via Terry Panopalis)

redundant B/RB-57As, B-57Bs and some of the RB-57Ds. When General Dynamics received the airframes they scrapped much of the aircraft leaving only the fuselage centre and aft sections, the horizontal tailplanes and the undercarriage. Remanufacturing saw rebuilt nose sections being fitted as well as the most obvious modification, the increased span wings that stretched to 122 feet, this increased the wing area to 2,000 sq ft. Also increased in area was the fin and rudder assembly that was required to maintain longitudinal stability under asymmetric power.

Powering this long-winged glider were a pair of Pratt & Whitney TF33-PW-11A turbofans each rated at 16,500 lbs.st which replaced the earlier turbojets. Should the RB-57F need extra thrust during its final climb to maximum altitude a pair of removable Pratt and Whitney J60-PW-9 turbojets rated at 2,900 lbs.st each were available for fitment under the outer wing panels. Although modifications to the original retained components were minimal much of the internal equipment was replaced thus many of the systems were re-worked to

Below: An EB-57B of the 134th DSES, Vermont ANG showing the moderate Bi-Centennial markings applied to aircraft of this unit. These consisted of a top of fin marking and a decorated rudder but little else. (via Terry Panopalis)

withstand the rigours of high altitude flight.

Of the total airframes 17 were rebuilt from retired bombers and reconnaissance aircraft whilst the final four were redundant RB-57Ds intended for high altitude reconnaissance unlike the others which still retained their sampling mission.

Controlling this aircraft in flight required a complete revision of the flight control system. Unlike their short wing counterparts the redesignated WB-57Fs were built without flaps. Instead inboard ailerons were fitted, all moving sections having fixed and movable trim tabs. Aiding the ailerons to provide lateral control were large retractable spoilers which were located forward and outboard of the trailing surfaces. The outer wing panels were manufactured with an anhederal of 1.5 degrees which provided aerodynamic stability during take off and landing whilst the wing tips were shaped to reduce trim drag and to act as end plates to stop the airflow bleeding off spanwise. To assist the crew in flying the aircraft a modified Lear MC-1 autopilot was installed which reduced the workload markedly.

The General Dynamics design team were well aware of the problems experienced by the single-spar wings fitted to the RB-57D therefore a three-spar wing was designed being covered in alloy honeycomb panels to reduce weight, but retain structural strength. The use of such material also allowed General Dynamics to reduce the number of internal ribs which in turn resulted in a smoother aerodynamic wing. Also improving the performance of the wing was the careful installation of the flight controls and good sealing between the wing and surfaces. The only extras added to the wings were the external mounting points for stores and the auxiliary engine pods.

Further modifications were carried out to the nose radome which was enlarged to allow the installation of radar systems and other specialist systems. Further avionics were placed in the space that had been occupied by the fuselage fuel tankage. Also removed were the rear fuselage air brakes. With the removal of the fuselage fuel tanks all was now carried in the outer wing panels which contained 3,870 US gallons. As

Below: B-57Es of the 8th TBS the nearest being 554265 and 521571 seen on the ramp at Clark AFB in the Phillipines in September 1969 (Don Jay)

Martin B-57 squadrons, units and users

Wing	Unit	Base	Period	Variant
3rd TBG	8th TBS	Japan	1956-64	B-57B
	13th TBS	Japan	1956-64	B-57B
	90th TBS	Japan	1956-64	B-57B
405th TFW	8th TBS	SEA	1964-68	B-57B
	13th TBS	SEA	1964-68	B-57B
35th TFW	8th TBS	SEA	1968-69	B-57B
	13th TBS	SEA	1969-72	B-57B/G
38th TBG	71st TBS	Laon AB, France	1955-58	B-57B
	405th TBS	Laon AB, France	1955-58	B-57B
	822nd TBS	Laon AB, France	1955-58	B-57B
345th TBG	498th TBS	Langley	1954-60	B-57B
	499th TBS	Langley	1954-60	B-57B
	500th TBS	Langley	1955-60	B-57B
	501st TBS	Langley	1955-59	B-57B
461st TBG	764th TBS	Hill AFB	1956-59	B-57B
	765th TBS	Hill AFB then ...	1956-59	B-57B
	766th TBS	Blytheville	1956-59	B-57B
17th TBG	34th TBS	Hurlburt	1956-57	B-57B
3510th	CCTW	Randolph	1954-56	B-57B
4424th	CCTS	MacDill	1969-72	B-57B/C
363rd TRW	41st TRS	Shaw AFB	1954-56	RB-57A
	43rd TRS	Shaw AFB	1954-58	RB-57A
460th TRW	Det.1		1966-70	RB-57E
4416th TEWS	22nd TRS	Shaw AFB	1969-71	B-57E
	62nd TRS	Shaw AFB	1972-76	B-57E
10th TRW	1st TRS	Germany/France	1955-57	RB-57A
66th TRG	30th TRS	Sembach, Germany	1955-57	RB-57A
33rd TG	Det.1	Taiwan	1962-64	
6250th CSG	Det.1	Taiwan	1964-65	
460th TRW	Det.1	Taiwan	1965-70	
6021st RS		Yokota AB	1956-57	
6091st RS		Yokota AB	1958-68	
556th RS		Yokota AB	1968-71	EB-57E
556th RS		Kadena AB	1971-72	EB-57E
18th TFW		Kadena AB	1972-73	
3rd TTS		George AFB	1956-60	B-57E
6th TTS		Johnson AB	1957-57	B-57E
8th TBS	TTF	Johnson AB	195760	B-57E
7272nd AGG		Wheeler AB	1957-61	B-57E
4756th TTS		Tyndall AFB	1958-60	B-57E
17th TTS		Yuma/McDill	1957-60	B-57E
1st TTS		Biggs AFB	1957-61	B-57E
1st ATS		Biggs AFB	1961-62	B-57E
4758th DSES		Biggs AFB	1962-66	EB-57B
4758th DSES		Holloman	1966-79	EB-57B
4677th DSES	Det.1	Holloman	1970-74	EB-57B
4677th DSES		Malmstrom	1959-74	EB-57B
4677th DSES		Westover	1959-74	EB-57B
17th DSES		Malmstrom	1974-78	EB-57B
5040th RES		Alaska	1958-63	EB-57B
5041st TOS		Alaska	1963-76	EB-57B
21st OS		Elmendorf	-1969	EB-57E
4713th DSES		Stewart AFB		B-57E
		Edwards AFB	1954-1973	various
		Eglin AFB	1954-70	various
		Wright ADC	1954-67	various
4950th		Wright-Patterson AFB	1967-70	various
6550th OS		Patrick AFB	1957-60	various
Air Force Missile Range		Patrick AFB	1960-65	JB-57B
RADC		Griffiths AFB	1965-72	various
ADC HQ		Peterson Field	1962-62	EB-57A
1001st OG		Andrews AFB	1958-62	B-57E
FAA Flight Check		Miami International	1956-62	RB-57A
Department of Commerce			1959-73	B-57A
NASA		Houston	1969-78	various
110th TRG	172nd TRS	Michigan ANG	1958-72	RB-57A
123rd TRG	162nd TRS	Kentucky ANG	1958-65	B-57B
106th TRW	149th TRS	Virginia ANG	1958-58	RB-57A
152nd TRG	192nd TRS	Nevada ANG	1961-65	RB-57B
258th DSEG	134th DSES	Vermont ANG	1974-78	EB-57B
189th TRG	154th TRS	Arkansas ANG	1958-65	B-57E
190th TRG	117th TRS	Kansas ANG	1958-73	RB-57A
190th DSEG	117th DSES	Kansas ANG	1972-78	EB-57B
4926th TS		Kirtland	1959-61	
1211st TS		Kirtland	1961-63	
58th WRS		Kirtland	1963-74	WB-57C
57th WRS		Avalon	1961-62	
55th WRS		McClelland	1960-62	
55th WRS	Det.1	Eielson	1962-63	
54th WRS		Guam	1962-64	
4028th SRS		Turner AFB	1956-57	RB-57D

Continued on next page

Continued from previous page

Wing	Unit	Base	Period	Variant
4028th SRS		Laughlin	1957-59	RB-57D
4028th SRS	Det.	Yokota AB	1956-57	RB-57D
4028th SRS	Det	Rhein-Main	1957-59	RB-57D
7407th SS		Rhein-Main	1959-64	RB-57D
1211st TS		Kirtland	1961-63	RB-57D
58th WRS		Kirtland	1958-63	RB-57D
4677th DSES		Hill AFB	1959-64	RB-57D
4677th DSES		HillAFB	1966-70	RB-57D
ASD		Wright-Patterson AFB	1959-64	RB-57D
7407th SS		Rhein-Main	1965-73	WB-57F
58th WRS		Kirtland	1964-74	WB-57F
58th WRS	Det	E. Sale, Australia	1965-66	WB-57F
58th WRS	Det	Argentina	1966-73	WB57F
58th WRS	Det	Eielson	1965-73	WB57F
6091st RS		Yokota AB	1965-68	WB-57F
56th WRS		Yokota AB	1967-72	WB-57F
9th WRG	Det.3	Yokota AB	1972-73	WB-57F
NASA		Houston	1969-78	WB-57F
Pakistan Air Force	31st Wing	various	1959-78	B-57B/C
Vietnamese Air Force		Tan Son Nut	1965-66	B-57B

Parked in its hangar this EB-57 is undergoing maintenance. Of note are the engine cartridge covers open which was a mandatory safety requirement and the chaff dispenser under the wing. The unit is not known but is probably one of the ANG squadrons. (John Harris)

Martin's had done such a good job of re-designing the original undercarriage for American use, that of the WB-57F, which weighed in at 61,500 lbs, was more than capable of catering for the increased sink rate of the reworked machine.

High altitude air sampling missions as practised by the first 17 WB-57Fs required the following mission equipment: four air samplers, four gas samplers, three radiation rate meters, a wing podion chamber, a cosmic ray spectrometer, an F-415P vertical panoramic camera for particulate photography plus data and voice recorders. Three special equipment sections housed these installations which were mainly grouped in a new nose, bomb bay and the second cockpit. The RB-57F was also capable of toting the two-ton HTAC high altitude reconnaissance camera into the air as well as various ELINT/SIGINT equipment that could be carried in the nose and the composite material wingtips. Further equipment could be carried in pods on any of the four underwing hardpoints, two per side.

The first rebuilt WB-57F, 63-13206, made its maiden flight from Fort Worth on 23 June 1963 with the first being accepted by USAF in February 1964. It should be noted that a completely new range of serials were allocated to this version in recognition of the extensive conversion work. The final machine was delivered in March 1967. The primary operators of the WB-57Fs were the 55th, 56th and 58th Weather Reconnaissance Squadrons, all part of the 9th WRW headquartered at McClelland AFB, California, part of the Air Weather Service which in turn was part of MATS.

One of the first deployments carried out by the RB-57F was to the 7404th Combat

WB-57F of the Johnson Space Flight Centre seen over the Mojave desert in 2003. It is used for high altitude atmospheric research. Note the wing pod experimental packages. (NASA via Terry Panapolis)

The only genuine operator of the B-57 outside the United States was Pakistan. These aircraft of the 31st Wing were part of 25 B-57B/Cs delivered in 1959. (BBA Archives)

Losses to the WB-57F fleet began in December 1965 and the final loss occurred when a wing separated at 50,000 feet in mid-1972.

One of the most unusual modification programmes was that undertaken for NASA who required a WB-57F for its Earth Resources Technology Resources programme. Altogether more than 30 different agencies, both military and civil, made use of the WB-57F before the survivors were retired to AMARC for disposal on 1 July 1974 when the 58th WRS finally deactivated.

Outside of the United States only Pakistan would utilise the services of the RB-57F. Only two machines were involved both arriving at Peshawar in 1965 just before hostilities erupted between Pakistan and India. Although their arrival was portrayed as an added extra to the PAF the real reason for their deployment was to monitor the Chinese nuclear tests which had begun in late 1964. As the tensions between the two Asian neighbours increased the USAF decided to remove both aircraft although only a handful of sampling flights had been undertaken. In the event only one departed before the fighting escalated the other being assigned to No.24 Squadron PAF for reconnaissance duties for which it was based at Mauripur AB near Karachi. As well as high-altitude reconnaissance missions over Indian territory the aircraft was modified to carry a maximum of 4,000 lbs of bombs on the underwing hard points although it was never operated as a bomber.

A second role was found for the lone RB-57F however and that concerned the jamming of Indian radar and radio traffic for which it operated in concert with a pair of PAF B-57Bs. It was during one of these missions that the aircraft was shot at by Pakistani anti-aircraft guns. During a later sortie undertaken on 15 September 1965 the aircraft was hit by a pair of SA-2 SAMs which caused extensive structural damage although enough control was available to allow the RB-57F to make an emergency landing at Peshawar AB. After extensive repairs in Pakistan the aircraft was returned to the United States

PROJECT MOON/PATRICIA LYNN

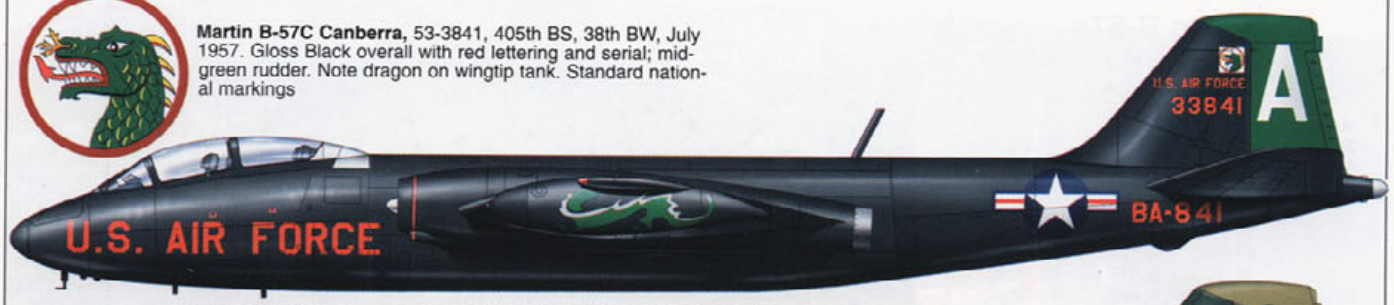
Although the standard B-57B was more than adequate for the duties demanded of it the Ho Chi Minh Trail, shrouded in shadows and trees, was proving to be an obstacle for accurate bombing. To rectify this shortfall USAF awarded a contract to Westinghouse Electric Corporation, with Martin Aircraft as primary sub-contractor, to the value of $49 million to modify 16 B-57B airframes for new duties. To be known as the B-57G the major modification involved a full rework of the nose section to house improved avionics and electro-optical tracking equipment.

Housed in the enlarged nose section were a Texas Instruments AN/APQ-139 forward looking radar, an AN/AAS-26 forward looking infra-red detection system. Also installed in the new nose were a Westinghouse low light television, laser rangefinder and an AN/AYK-8 weapons delivery package. The radar and IR systems were used in the detection of targets whilst the laser was used for ranging. To successfully deliver weapons the TV monitoring system in the rear cockpit displayed the results from the electronics and the electro-optical system simultaneously to the WSO.

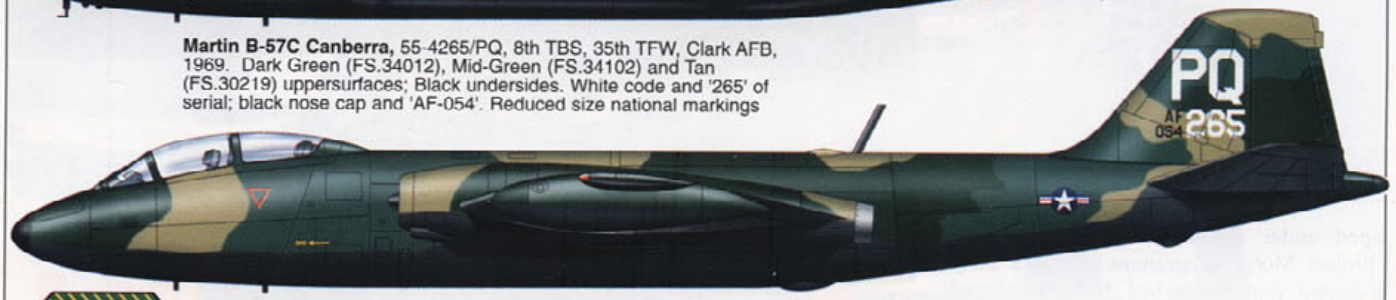
The low light TV systems had been devel-

This B-57C - part of the Pakistan 31st Wing, differed from others of its kind by having a mid-grey upper surface colour scheme with black undersides. Note also the modified nose configuration of all of these aircraft (A.W.Hall collection)

Martin B-57C Canberra, 53-3841, 405th BS, 38th BW, July 1957. Gloss Black overall with red lettering and serial; mid-green rudder. Note dragon on wingtip tank. Standard national markings



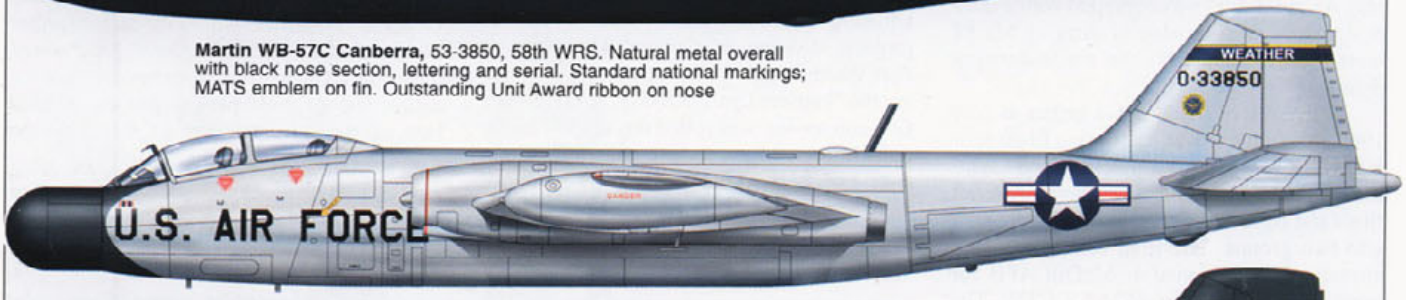
Martin B-57C Canberra, 55-4265/PQ, 8th TBS, 35th TFW, Clark AFB, 1969. Dark Green (FS.34012), Mid-Green (FS.34102) and Tan (FS.30219) uppersurfaces; Black undersides. White code and '265' of serial; black nose cap and 'AF-054'. Reduced size national markings



Martin B-57C Canberra, 53-3840/FS, 4424th CCTS, 1st TFW. Dark Green (FS.34012), Mid-Green (FS.34102) and Tan (FS.30219) uppersurfaces; black undersides and nose cap. White lettering and serial; black cockpit canopy framing. Reduced size national markings. 1st TFW badge on nose

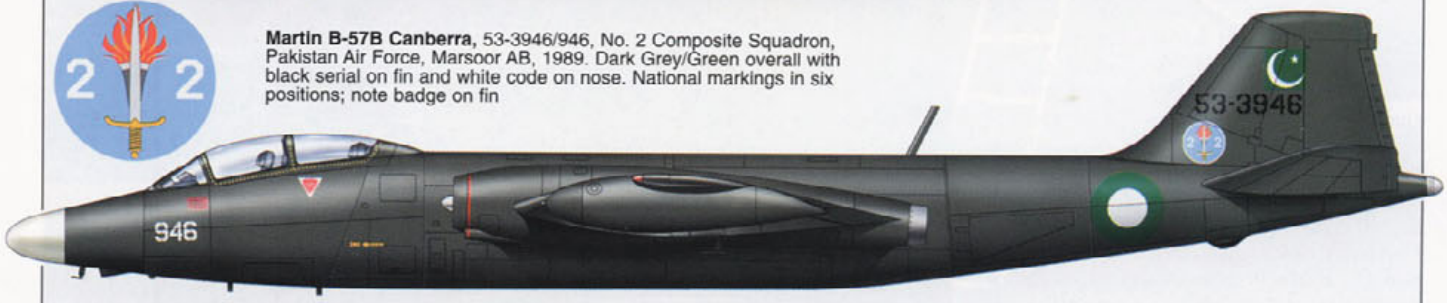
Martin B-57C Canberra, 53-3840, 117th DSES, July 1975. Dark Green (FS.34012), Mid-Green (FS.34102) and Tan (FS.30219) uppersurfaces; Black undersides. Black lettering, serial and nose cap; white cockpit canopy framing. Reduced size national markings

Martin WB-57C Canberra, 53-3850, 58th WRS. Natural metal overall with black nose section, lettering and serial. Standard national markings; MATS emblem on fin. Outstanding Unit Award ribbon on nose



Martin B-57C Canberra, 53-3952, Pakistan Air Force. Gloss Black overall with red lettering and serial. Green/white roundels in six positions

Martin B-57B Canberra, 53-3946/946, No. 2 Composite Squadron, Pakistan Air Force, Marsoor AB, 1989. Dark Grey/Green overall with black serial on fin and white code on nose. National markings in six positions; note badge on fin



Martin B-57s delivered to Pakistan during 1959

Model	Serials	Model	Serials
B-57B	53-3885	B-57B	53-3952
B-57B	53-3886	B-57B	53-3954
B-57B	53-3938	B-57B	53-3955
B-57B	53-3939	B-57B	53-3956
B-57B	53-3941	B-57B	53-3957
B-57B	53-3942	B-57B	53-3958
B-57B	53-3943	B-57B	53-3959
B-57B	53-3945	B-57B	53-3960
B-57B	53-3946	B-57B	53-3961
B-57B	53-3947	B-57C	53-3834
B-57B	53-3949	B-57C	53-3846
B-57B	53-3950	B-57C	53-3848
B-57B	53-3951		
		Total	25

oped under the auspices of the USAF 'Project Moon' programme whilst a belly mounted gun turret had been developed under the Pave Gat programme. The turret contained a M61AI cannon which was slaved via the aircraft computer from the EOVS. Although deemed an excellent system after extensive testing at Eglin AFB, Florida, the project was later discontinued. The primary system mounted in the reshaped and enlarged nose housed the Texas Instruments AN-/APQ-139 radar system that had an effective range of about ten miles depending on the weather and ground contours. Within this range the system could track slow moving targets down to a speed of five mph which was more than adequate for slow trucks moving along the trail. As well as target data the radar was also capable of ground mapping and terrain following. Also altering the contour of the nose was a chin protuberance that housed the low light TV, the IR system and the laser tracking system. As the B-57G was equipped with a laser designator it was capable of carrying Mk.82 laser guided bombs on the six underwing pylons.

Deliveries of the B-57Gs began in July 1969 although one was lost during flight testing whilst practising a single-engined asymmetric landing close to the Martin Aircraft flight test centre. The remaining 15 were split into two groups. The first, comprising four aircraft, were stationed at McDill AFB for crew training with the 4424th CCTW. The remaining 11 machines were deployed to Ubon AB, Thailand, where they were taken on strength by the resurrected 13th TBS. Arriving in September 1970 the aircraft and crews were soon deployed on night interdiction missions against targets moving down the Ho Chi Minh Trail. During this deployment one aircraft was lost ostensibly to ground fire although subsequent investigations revealed that it was more likely that the B-57G had collided with a Cessna O-2A employed on Forward Air Control duties. Although on paper the B-57G was an impressive machine reality showed that the conversion fell short of expectations especially in the area of available engine power as the converted bomber was underpowered. When the B-57G was first mooted General Dynamics had suggested that the aircraft be powered by the Pratt and Whitney J57 turbojets as successfully applied to the RB-57D.

Inside its revetment at Phan Rang AB, this B-57B undergoes rectification of its nose wheels after which a pre-flight including arming was to be carried out. (Mark de Witt)

However in an outbreak of parsimony the USAF declined to improve the behaviour of the B-57G by installing these engines. Operational frontline service for the B-57G lasted just short of two years before being withdrawn from the South East Asia Theatre of Operations. After withdrawal the remaining aircraft were passed onto the 190th Tactical Reconnaissance Group of the Kansas Air National Guard based at Forbes AFB, Kansas. Use by the ANG would end in 1974, the remainder ending their days at AMARC.

Only one other special version of the B-57 would be developed for use in Vietnam. Utilising a pair of spare B-57Es the special projects division of General Dynamics at Fort Worth began work in early 1963 to create the 'Patricia Lynn' RB-57E aircraft. The first conversion was rolled out in 1963 being quickly joined by a second one. Once flight tests had been completed the two aircraft were deployed to Tan Son Nhut AB in Vietnam for use in both the day and night reconnaissance role in that country. The primary area modified to produce the 'Patricia Lynn' aircraft was centred upon the nose which was radically altered to house a Fairchild KA-1 forward oblique camera with a 36 inch lens and a Fairchild KA-2 vertical camera.Those in the nose were supplemented by a Fairchild KA-56 panoramic unit which was steerable from horizon to horizon being vertically mounted in the bomb bay and was particularly effective at altitudes below 200 feet. Also mounted in the bomb bay was a Fairchild F-477 split-vertical camera especially optimised for night photography.

The first two machines were obviously successful as a further two B-57Es were also converted to 'Patricia Lynn' standard and painted matt black for service in Vietnam. Later another pair of aircraft were converted by General Dynamics for the same purpose. General Dynamics would become further involved in the 'Patricia Lynn' programme when they carried out an extensive modification and upgrade programme on at least two of the aircraft. Part of this upgrade

Safe in its revetment this B-57B is undergoing pre-flight maintenance thus the engine cartridge covers are open and the ground crewman is loading cannon shells into the wing gun drums (Mark de Witt)

Using a weapons loader the armourers load a silver painted napalm tank under the wing of a B-57 in Vietnam. (Mark de Witt)

included the installation a Texas Instruments AN/AAS-18 infra-red reconnaissance system. Although this system had performed well enough under test conditions, in the field the system's behaviour was less than adequate. At least two issues were raised from the Vietnam experience, one was low reliability in poor weather, the other was a resolution problem that occurred above 2,000 feet. Maintenance was also highlighted as excessive man hours were needed to keep the system even close to operational. Overall the IR reconnaissance system was less than useful and would eventually be discarded.

Only one frontline unit ever flew the 'Patricia Lynn' aircraft this being the 460th Tactical Reconnaissance Wing which would eventually deactivate in September 1971 whilst still in Vietnam. Four of the 'Patricia Lynn' aircraft were returned to the United States where they were taken on charge by the 4677th DSES based at Hill AFB, Utah. Service use of the specials ended in 1972 when the last was despatched to AMARC for storage.

Under preparation this EB-57 is being worked on by its ground crew. Access to the cockpit is courtesy of a double ladder clipped to the airframe while the ground crew use a ladder leaning against the wing leading edge. (John Harris)

TEST AND DEVELOPMENT

The B-57, like its English Electric counterpart, was quickly adopted by numerous organisations as a test bed for various avionics packages. One of the first was 'Operation Redwing' which was initiated by the Defense Atomic Support Agency, this involved the development of high resolution low-light-level television systems whilst the 'Compass Eagle' programme covered the development of the infra-red reconnaissance system. A programme involving the development of radar camouflage techniques was initiated during 1967 whilst high level aerial cloud cover photography was undertaken during 1969. In 1970 the 'Pave Gat' project covered the development of the Emerson Electric belly gun turret and associated guidance systems whilst the laser guided bomb programme was also undertaken during the same period.

Outside of the various defence programmes NASA also employed the B-57 for various experimental projects. One of the best known involved the development of pump fed liquid hydrogen systems to calibrate solar cells needed to measure the spectra of reflected solar energy. A follow on from these flights concerned the American quest for the supersonic transport, these flights, known as 'Coldscan', numbered 19 in total and measured atmospheric turbulence and temperature gradients at various altitudes.

A further B-57B was bailed to Temco Aircraft Corp in 1956 for development of the Boeing IM-99A Bomarc guidance system. The modifications applied to the airframe for these trials required that a 17 foot missile shaped extension be mounted on the nose. To divorce the guidance system as much as possible from the carrier aircraft, separate hydraulic and electrical systems were installed plus ammonia and nitrogen tanks for cooling and pressurisation of the grafted on missile section. To compensate for this extra weight the structure required strengthening and pilots were briefed to handle the whole ensemble carefully. Once the static and flight testing had been completed by Temco the B-57B was handed over to Boeing for testing and evaluation. With all manufacturer's tests completed the converted bomber was passed to the Air Force Missile Test Centre for airborne research on the Bomarc systems.

Further missile trials required the use of two B-57B airframes which were fitted with the nose sections from the Goodyear Aerospace Corporation TM-76 Mace missile. Once initial flight trials had been completed both aircraft were used to simulate the flight path of the missile and test the tracking and guidance systems capabilities. Further trials were carried out on terrain following radar systems using an NRB-57B on loan to the Cornell Aeronautical Laboratory. The first system investigated by CAL was the Autoflite TFR which was tested between 1958 and 1962. Once CAL had completed its work the aircraft was then offered to Westinghouse for trials of another type of TFR that would later evolve into the 'Tropic Moon' system which entered USAF service in its version III form in the B-57G. After all this excitement the NRB-57B was finally retired to AMARC.

Dropping its full weight of ordnance in an attack on Vietnam positions this B-57B BA-898 was still in its natural metal finish before the introduction of camouflage. (USAF)

Reconnaissance developments were undertaken using an RB-57D which was transferred to 'Project APRE' (Aerospace Photographic Reconnaissance Experiments) in 1964. To facilitate accurate resolution calibration the aircraft's upper surfaces were painted in sharply defined shapes in black and white with a single grey section being reserved for verification and calibration of colour film renditions. Also added to various parts of the aircraft's upper surfaces were convex mirrors which reflected the light in an attempt to confuse the photographic systems. Testing of the reconnaissance system against the aircraft required that a balloon and its gondola be lifted to an altitude of 100,000 feet. Inside the gondola was a camera array which was triggered by the RB-57D flying past at predetermined heights and speeds. The resulting photographs, when analysed , revealed how well the cameras and their lenses were performing. Once the data had been fully digested USAF was able to determine the camera arrays that would be needed in high altitude reconnaissance aircraft and satellites. In a similar manner a pair of JB-57B aircraft were used by AF Missile Test Centre for the calibration of missile tracking cameras. For this purpose each machine had a distinct pattern applied to the right hand side of the forward fuselage.

CANBERRAS IN THE VIETNAM WAR

When the United States began to increase its involvement in the Vietnam conflict in 1963 the B-57 was one of the first types in theatre. These first representatives were two of the converted RB-57Es which had been modified for use in the 'Patricia Lynn' project. The first combat reconnaissance flight was undertaken on 7 May, the crew being Captain William Scott and Lt. Bill Sung. The first aircraft were joined by two others in July, the whole ensemble being designated Det.1 of the 6091st RS headquartered in Japan. Having proven that the RB-57E concept was viable the Temporary Duty (TDY) nature of the mission was replaced by one of a more permanent order. This change was reflected by the change of operator in July 1963 when the 33rd Tactical Group became responsible for Det.1. In August 1965, with a strength of five aircraft, the parent unit became the 6250th Combat Support Group although in an effort to confuse everybody the parent unit was changed yet again within 12 months to the 460th TRW. As many of the parent unit changes were nominally paper only, the RB-57Es always retained their callsign of 'Moonglow'.

For the first two years of operations the RB-57Es flew their missions without loss although this changed on 6 August 1965 when 55-4243 was hit by small arms

Engine change at Elmendorf. An RB-57E with covers over its canopy and a suitable crane to lift the engine out of its nacelle was serviced by civilian work people during an early Canberra deployment to Alaska.

ground fire whilst undertaking an infra-red reconnaissance mission at night. Although aware that their aircraft had been hit the crew felt comfortable enough to begin a return to base. Some two miles out from Tan Son Nhut the aircraft lost aileron control which indicated a possible fire in the bomb bay. It was in fact far more serious, as ground observers could quite clearly see, as a long streak of flame trailed alongside the left hand rear fuselage. As the Canberra's behaviour became more erratic the pilot, Capt Dick Damon, ordered the aircraft abandoned. Both crew ejected safely, the stricken aircraft finally crashing some one and a half miles from base.

Another loss, the second and final, occurred on 25 October 1968 when 55-4264 was hit by heavy ground fire which seriously damaged the left hand engine leaving the crew with no other option but to eject safely. RB-57E '264' had in fact starred in a sequence of photographs taken after a Viet Cong attack on Tan Son Nhut AB. The portraits revealed an airframe liberally peppered with shrapnel damage from mortar and rocket rounds. Due to the extent of the damage the aircraft had to be returned to Japan for repair. After the loss of '264' it was replaced by 55-4257 which differed from the earlier aircraft by the installation of a Terrain Following Radar system. However as the crews were very unsure of the reliability of the TFR it was little used. As the war continued the RB-57Es underwent numerous modifications which rejoiced in such names as 'Compass Haste' , Compass Sight' and 'Compass Eagle' The latter programme was one that has seen continued development as it provided real time infra-red target data provided by an scanner whose data was displayed on a screen in the cockpit. This particular system was especially useful over the rivers south-east of Saigon where the Viet Cong used the cover of night to move supplies using sampans. Nicknamed the 'Moonriver Missions' the targets once detected would have their location passed onto either the Navy river patrols or the USAF. Such operations were so successful that river traffic was cut back considerably.

During the period 1969-70 the 'Patricia Lynn' aircraft were flown regularly over Laos in support of the 'Steel Tiger' and 'Barrel Roll' missions whilst further sorties were flown over Cambodia in support of the American invasion of that country in 1970. It was during this year that Det.1 was given a special citation by MACV in recognition of their outstanding contribution to the Vietnam war effort by providing up to 94 per cent of intelligence. When the 'Patricia Lynn' project finally finished in mid-1971 many of the aircraft had reached the highest flying hours for the type some exceeding 8,000 hrs.

The two remaining squadrons of the 3rd BG, the 8th and 13th BS, were diverted to Clark AFB in the Philippines by order of Defence Secretary Robert McNamara. B-57s of the 13th BS began to arrive at Clark AFB on 9 April 1964 when 12 aircraft led by their commander, Lt Col W A McLeod landed. The 8th BS, led by Lt Col F W Grindle Jnr began arriving on 17 April. With all 47 aircraft safely at the new base an intensive training programme for combat operations began. It would be a time of nervous tension for the Canberra crews as direct intervention in the Vietnam conflict was forbidden unless American forces were directly attacked The situation changed completely on 2 August 1964 when the *USS Maddox,* operating in international waters in the Tonkin Gulf was subject to an unprovoked attack by North Vietnamese gunboats. This violation against one of their ships finally gave the Americans the excuse they had been waiting for. In response the Canberras at Clark AB were placed on a war footing .

Preparations were put in hand to move them to their designated front line operating bases at Takhli AB, Thailand and Bien Hoa AB near Saigon, a process that began on 4 August with the bombers departing at night. Over the next three days they arrived in theatre with one reportedly crashing on landing while three others were the subject of incident reports having been damaged during the same phase. As the accidents had happened at Bien Hoa the remaining Canberras were diverted to Tan Son Nhut AB. The survivors plus those repaired were used by their crews for training and familiarisation sorties, a much needed requirement given the changeable weather. It was also a period of frustration as the patrolling aircraft were for -bidden to attack any targets of opportunity that presented themselves, to reinforce this political nonsense the order was enforced by flying each sortie unarmed. Much of this deployment would be in vain as the events of 1 November 1964 at 00:24 hours were to prove when the flightline as Bien Hoa AB was mortared by the Viet Cong.

Although concrete revetments would later litter all the airfields in Vietnam the flightline resembled those of far calmer days. The subsequent explosions from the incoming rounds and loaded bombs destroyed five of the B-57s and damaged 15 others to some degree. Such a blow reduced the viable B-57 fleet to a maximum of 21 aircraft as the losses would never be replaced and unservicabilities would frequently reduce the total further. Protecting the remainder was however given a high priority thus impressive sandbag revetments were constructed prior to more permanent edifices being built.

Full blown combat came the B-57s way on 19 February 1965 when a mixed force, which included some F-100s, attacked a

Escorted by an all-black B-57A this single-pilot RB-57 was probably one of the first to have the extended wing fitted experimentally. The span was increased to 122 ft giving a wing area of 2,000 sq ft. 53-3977 seen here has a single pilot cockpit and does not have the re-engined facility of the WB-57F which was developed from it.

In the light of an early morning the crew of an EB-57E climb aboard their aircraft for another spoof mission. The various open panels give access to the battery, nitrogen contents and the bomb door guard switch. These will be closed by the ground crew during pre-taxy checks

series of targets at Bien Gia in Phuoc Tuy Province some 40 miles east of Saigon. This would be one of the few occasions that the B-57 was flown in any strength as operations were normally flown in pairs. Further missions were then flown against Man Yang on Route 19 where the intervention of the Canberras were reported as being directly responsible for saving the lives of 220 troops under siege. Up to this point the B-57s had flown their missions without loss although this would change on 11 March when the first casualty occurred. This act dampened the exuberance of the crews of the 8th and 13th BS who would view the war in a more sombre fashion from then on.

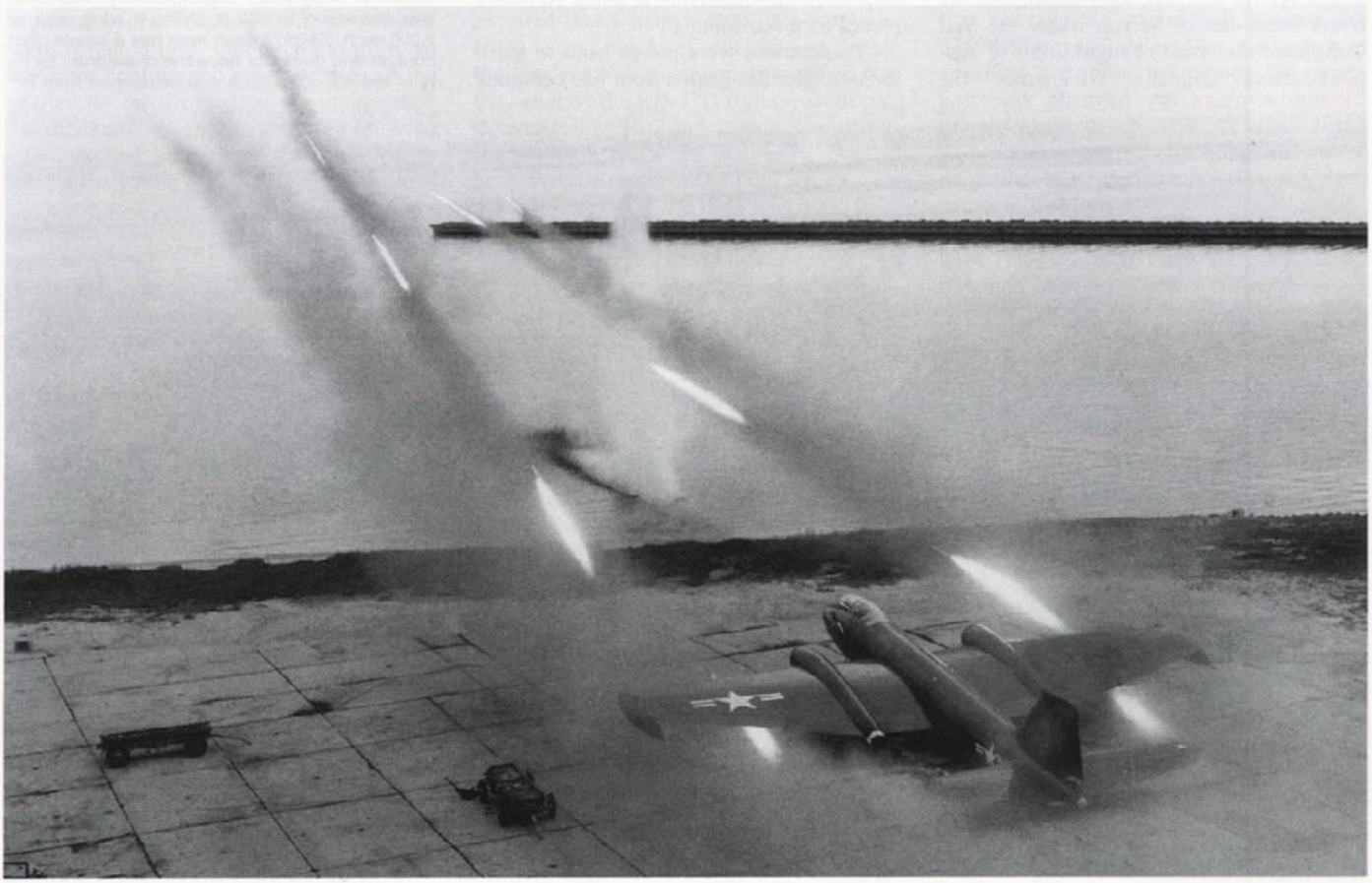
Already recognised as a steady and reliable weapons platform the capabilities of the B-57s were stretched even further when a handful were teamed up with a small number of 'Blind Bat' C-130 flareships for operations over the Ho Chi Minh Trail. Ranging up and down the full extent of the trail, including into Laos, the B-57s soon racked up an impressive combat record. The operations over Laos were known as 'Steel Tiger' whilst their daylight equivalents were 'Barrel Roll' and 'Tiger Hound'.

A report in April 1965 gave the B-57 strength in SEA as 16 B-57Bs and three RB-57Es all based at Bien Hoa AB. However this would soon change when in May disaster struck again during a bombing up operation. A 500 lb bomb with a delayed action fuse malfunctioned and exploded, the subsequent conflagration destroyed ten aircraft parked wingtip to wingtip. This left six available for further sorties, these had survived by being airborne on strike missions at the time. As such a small force was not really viable the decision was taken to replace the lost aircraft, thus 14 more would be sent to Vietnam. Although there were human casualties, some 20 in number, this was far less than would normally be expected as the Canberra ground crew of the 405th ADVON Det.1 had moved away from the bombers to watch the unusual sight of a US Navy F-8 Crusader landing. The airborne B-57s were diverted to Tan Son Nhut AB, the ground crew being bussed over to meet them.

The arrival of the replacement Canberras meant a change of base for the 8th and 13th BS to Da Nang AB so that operations could resume. With the B-57 force restored, combat missions were restarted in October 1965 when a mixed force undertook support missions against NVA forces besieging Plei Me. During the six days of fighting over 700 combat sorties were flown, a goodly number being credited to the B-57s.

Although all combat missions over Vietnam were hazardous the B-57 force managed to maintain its 20 aircraft strength. The move to Da Nang also heralded a change in the way the deployment was managed as it was redesignated a TDY thus allowing crews to rotate back to Clark AB for resting every 60 days. Changes were also

Test firing rocket packs from underwing stations on the B-57B during the period around 1958 when the aircraft first went into squadron service. (USAF)

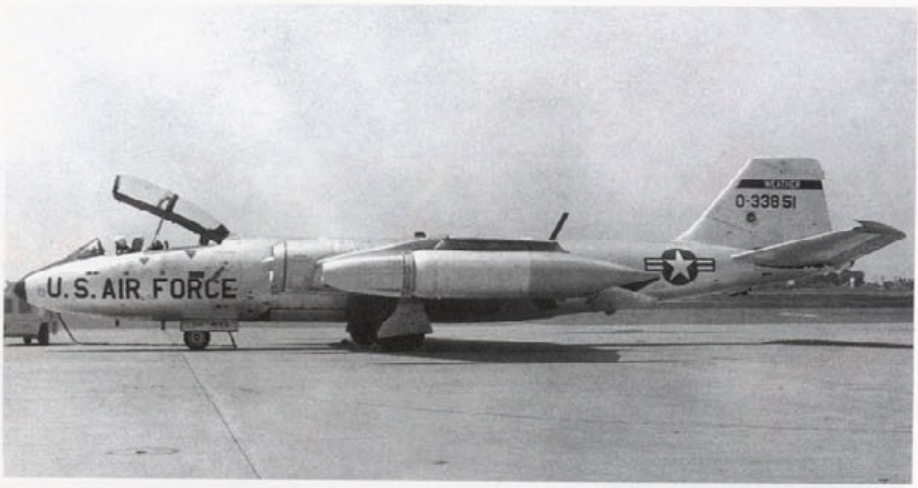


afoot with the control of the squadrons which would lose their semi-autonomous status on 21 June 1965 becoming part of the 6252nd TFW, later the 35th TFW, for administrative purposes however the 'Yellow Bird' and 'Red Bird' call signs for the 8th and 13th would remain for whichever squadron was operating at the time.

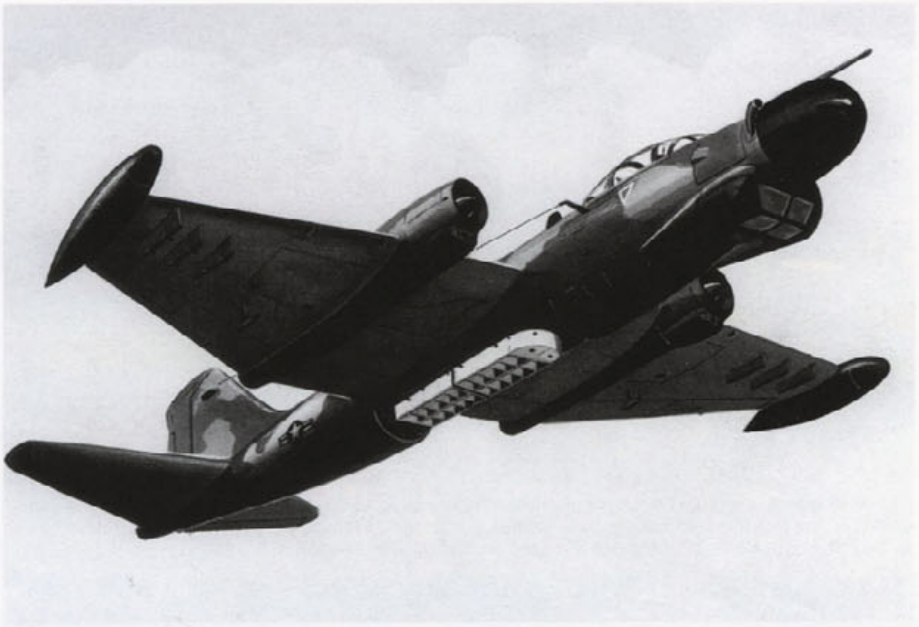
In 1966 the infamous 'DOOM Pussy' raids over North Vietnam began. Standing for the 'Da Nang Officers Mess' the raids were flown at night where the intensive NVA anti-aircraft fire was even more frightening. During these missions a stuffed cat in the Officers Mess was turned to face the wall only changing its position when the aircraft had returned safely.

On 13 October 1966 the remaining camouflaged B-57s vacated their overcrowded Da Nang base for new facilities at Phan Rang. Even though the base was far from complete, operations were started immediately upon arrival. It was during the following 15 month period that the squadrons would lose four aircraft on operations.

Even amongst the gloom there was some cause for celebration in 1967 as the 8th and 13th BS celebrated their 50th anniversaries as the oldest active units in USAF. On 15 January 1968 the 13th BS, the 'Grim Reapers' were stood down leaving the 8th as the sole tactical bomber unit. By June 1969 the number of B-57s available for operations had fallen to nine aircraft thus the decision was taken to deactivate the 8th BS. This occurred in September 1969 when the last B-57Bs left Phan Rang and 'Happy



Above: A WB-57C with a short nose and large air sampling tanks on the wing tips. The unit was the 58th Weather Reconnaissance Squadron based at Kirkland AFB between 1963 and 1974. Below: B-57B of the 13th TBS, 405th TFW taxying out from its Vietnamese revetment.



The ultimate Canberra. Although only an artist's impression this B-57 has a radar nose, forward looking cameras and bomb bay bomblet dispensers. Six hard points are under the wings.

Valley' for the last time. The last departure occurred on 15 September, all the survivors routing back to the United States via the Philippines to end their days at MASDC, later AMARC. For those with a love of statistics the following may be of interest. Of the 96 Canberras sent to Vietnam only one in three would survive operations. Of the 32 that remained some would enter the B-57G conversion programme while others would leave storage for further usage by the DSES units.

THE VNAF AND THE B-57

The VNAF whose acquistion of the B-57 was trumpeted in the *Saigon Sunday Post* on 1 August 1965 was very much an operator of 'repaint' bombers. The programme had actually begun in May 1964 when the B-57s had first arrived at Clark AB. The VNAF liaison team suggested that a group of six pilots be trained to fly the B-57 although the rider to this idea was that they were to be jet qualified and have a reasonable tally of combat missions. The first group of pilots undertook their transition training under the aegis of the 2nd Air Division at Clark AB in secret as the Geneva Accords had forbidden the supply of such equipment after the collapse of the French forces, it being thought that the provision of jet aircraft would escalate hostilities in the region. The second group were fortunate enough to undertake theirs at Tan Son Nhut AB, Vietnam. However these were no ordinary pilots as they included the C-in-C of the VNAF, General Nguyen Cao Ky.

When the first B-57B arrived at Tan Son Nhut AB on 1 August 1965 it was obvious that the aircraft had been hastily transfered from the USAF as would be any others that appeared in VNAF markings. Even so four aircraft resplendent in VNAF marks carried out a ceremonial flyby on 9 August to mark the acceptance of the B-57. Although there were no actual aircraft handovers the crew training programme proceeded apace with both pilots and navigators being trained at Clark AB. Once the training was completed each crew joined up with either the 8th or 13th BS for combat missions until enough were qualified to actually form a bomber unit. Unlike the remainder of the VNAF the B-57s remained under the operational control of USAF. Likewise the designated aircraft were frequently rotated as maintenance schedules moved the B-57s about.

Having established the training programme further VNAF pilots and navigators were drafted to Clark AB for conversion training which began on 20 September 1965. Each pilot received 70 hours of flight time spread over 40 sorties before being cleared for operations. Training for navigators began on 11 October and included two from the Philippine Air Force. This move was required for political reasons as the programme was sponsored by the US State Department and needed local involvement before foreign nationals could be allowed to enter for military training.

Upon returning to Vietnam the newly qualified pilots and navigators flew operational sorties with their USAF counterparts in either the 8th or the 13th BS depending upon which unit was available. Even as the VNAF crews gained experience and flew in aircraft carrying VNAF markings their missions were still under the strict control of MACV.

Although on paper the VNAF had a bomber force it was felt that they were not making a big enough impact in the press and on the war. To rectify this omission five B-57Bs resplendent in VNAF markings, but piloted by USAF crews, left Da Nang AB on Vietnamese Armed Forces Day, 29 October 1965. Fully loaded with bombs they made pre-planned attacks on suspected Viet Cong strongholds. With the successful completion of the mission the aircraft returned to Tan Son Nhut AB where they were refuelled before taking part in a victory flypast over Saigon.

This was in reality a false dawn as problems with crew availability had meant that the bomber force was being manned more and more by USAF crews. Another problem that reared its head was the admission by the pilots that the B-57 was difficult to manoeuvre by the diminutive Vietnamese pilots. This problem was later compounded when a pilot under instruction crash-landed a B-57 at Clark AB completely destroying the aircraft. Further incidents finally saw the VNAF B-57 programme cancelled on 20 April 1966.

FOREIGN B-57 CANBERRAS

The second non-US airforce using B-57s was the deployment of three RB-57D aircraft to Taiwan in 1959 in response to the Taiwan Straits crisis. Based at Tao Yuan AB all three aircraft sported Nationalist Chinese markings. During the four year period of this deployment at least one RB-57D was shot down having started its approach descent too early. The remaining two machines returned to the United States in 1963.

Pakistan would be the only genuine operator of the B-57 and began taking delivery in September 1959. The contract had been negotiated during a state visit by President Eisenhower, the aircraft being delivered under the auspices of the Military Defense Assistance Plan. All 25 aircraft were ferried to Mauripur AB, Pakistan, by USAF crews

This nose-on view of an EB-57E shows the nose waveguide horns installed later in the type's career. Also clearly defined are the various colours applied to the airframe. (John Harris)

This view of the EB-57Es of the 4677th DSES based at Westover AFB shows the different day-glo panels on the nose. Note should also be taken of the nose probe colours and the various lumps and bumps on the nose cone. (John Harris)

where they would form the basis for the 7th and 8th Bomber Squadrons of the 31st Bomber Wing. Both units were declared operational on 11 May 1960 their first commanders being Sqdn Ldr's Ayaz A Khan and Muhammad Iqbal respectively. As originally delivered the B-57s lacked the promised RB-1A 'Georgia Peach' bombing system. To speed up the installation of this system which required a reworked nose profile Martin Aircraft modified a set of spare noses retained at the production facility. These were then flown to Pakistan to replace the standard nose sections. The removed items were returned for modification, a process that continued until the complete fleet had been upgraded. Another modification applied to the PAF fleet was the ability for some B-57s to carry four external fuel tanks culled from the in-service PAF F-86 fighters so that the bombers could reach Calcutta.

For their first few years in service the B-57s of the PAF followed a peacetime regime which would be enlivened in October 1964 when a four ship display team from No.31 Bomber Wing performed aerobatics in front of an audience of invited guests including the C-in-C of the Indonesian Air Force, Air Marshall Omar Dani. Led by the Wing's Officer Commanding, Wing Cdr Latif, the display team put the B-57s through their paces above Peshawar.

The Canberras of the PAF finally went to war in September 1965 for 23 days against India, a nation that also operated Canberras albeit British-built machines. During this campaign the airfields at Jamnagar, Jodhpur, Ambala and Adampur were attacked as were those at Halwara, Srinagar and Pathankot. During this period the PAF Canberras undertook 195 missions dropping some 600 tons of bombs, the whole being undertaken at night. A typical night's work would require the bombers to depart from one base, hit their targets, then return to another base for refuelling and rearming. This period on the ground was then followed by another sortie against the Indian bases in the north before returning to their home base at Karachi. During this period the PAF lost three aircraft. One was lost when it flew too low and crashed into the ground. The second was hit by anti-aircraft fire whilst the third was lost when it crashed on approach to Risalpur in adverse weather. The last mission flown by the B-57s of the PAF was undertaken on 22 September using four aircraft all of which returned safely.

As a consequence of this action the United States ceased the supply of spares thus forcing the PAF to fall back on their own resources. From an airframe point of view this was not beyond possibility however the question of overhauling the J-65 engines did cause some concern. As ever the resourceful PAF found a way to overcome this problem although the writing was on the wall by 1970 when aircraft were being retired for cannibalisation. The United States had made a one time offer of military equipment to Pakistan during that year, this however had been rejected as the spares needed for the B-57s were not included and Pakistan was in the process of receiving aircraft such as the Chinese Fantan as replacements. Although these aircraft were less sophisticated than their American predecessors, spares at least were plentiful. Given the reduction of the fleet by war and attrition it came as no surprise to find that the 31st BW and the 8th BS were disbanded on 30 May 1970 leaving the 7th BS as the only operator.

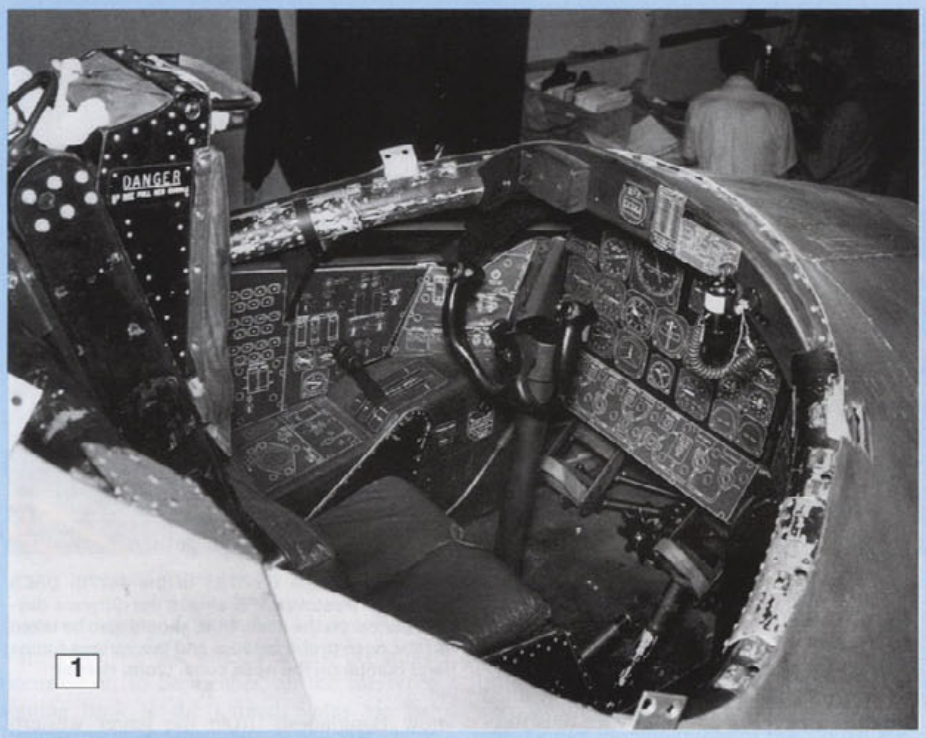
In December 1971 a further outbreak of hostilities with India erupted heralding the start of the 14-Day war and the B-57s final foray into battle. The cause had been India's response to the cessation of East Pakistan, now Bangladesh, from the larger western sector. The forces from west Pakistan had taken part in a brutal repression of those in the east which had led to tens of thousands of Bengalis fleeing into India. In response to the events happening in east Pakistan India massed its troops along the border to which the Pakistanis took offence. Their response was to attack.

The first mission, on 3 December, utilised 15 of the 16 remaining aircraft which made attacks upon Indian airfields. Twelve bases were targeted and suffered hits from 183 bombs resulting in many being put out of action for a number of days. Direct strikes against Indian military targets were made at medium altitude by the PAF Canberras during which three aircraft and crews were lost.

Possibly one of the most spectacular raids occurred during daylight when Indian forces penetrated into Pakistan along the Khokhrapur-Chor railway line towards

Continued on page 40

Tail code 'PQ' was allocated to aircraft of the 8th TBS of the 35th TFW based at Phan Rang AB. Both wear the finish of the period and carry napalm tanks under the wing. (Mark De Witt)



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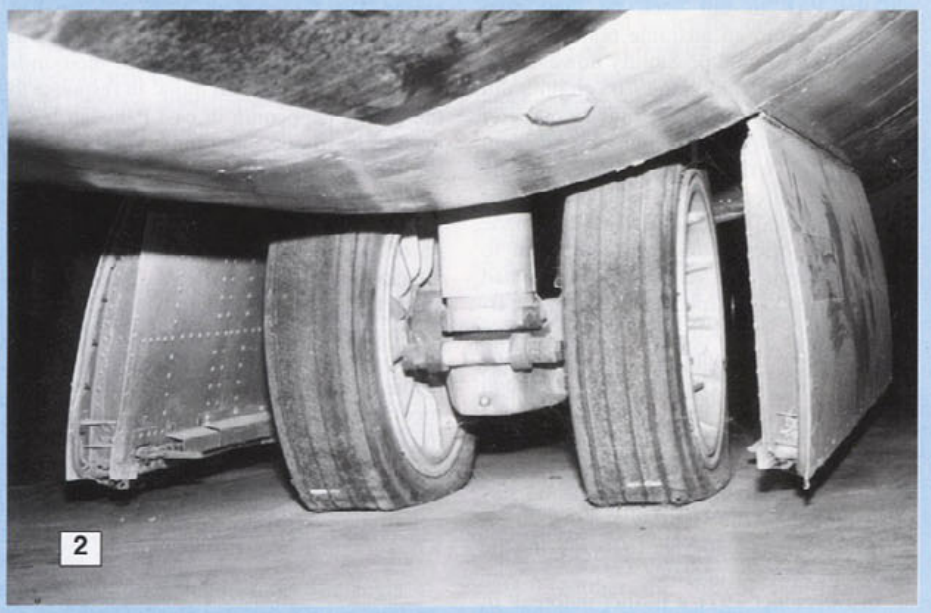

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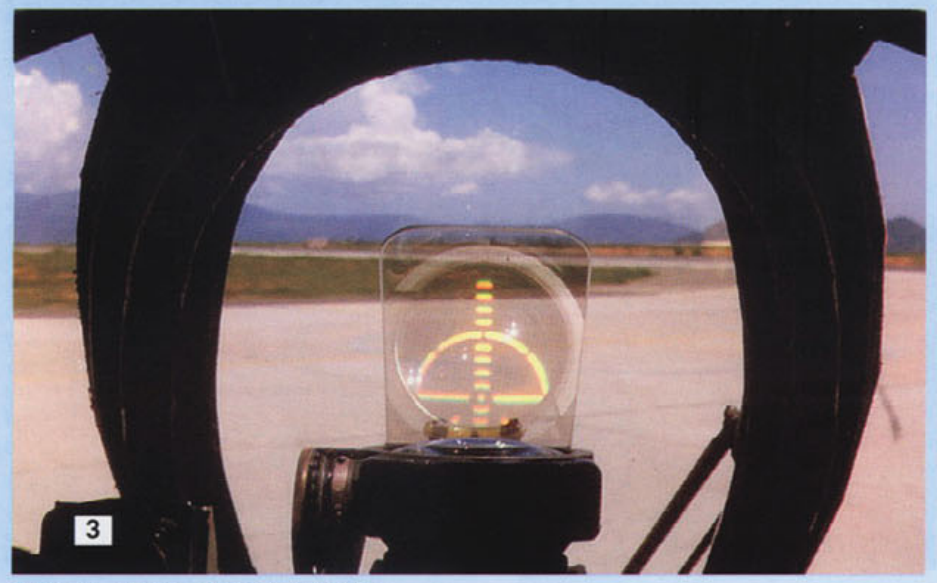
4

Martin B-57 CANBERRA IN DETAIL

PHOTOGRAPHS VIA THE AUTHOR OR TERRY PANOPALIS

1. The pilot's cockpit in the B-57 was comparitively uncluttered. A Mk.2 Martin Baker ejection seat was fitted. 2. The nose wheel of a B-57 showing that it was in need of some air. This is possibly a graveyard aircraft or one about to be scrapped. 3. Pilot's view when looking through the canopy with the gun sight in the foreground. A windscreen wiper appears on the right. 4. Engine intake with emphasis laid on the central container for starter cartridges. Note the extra air intakes under the cowling.



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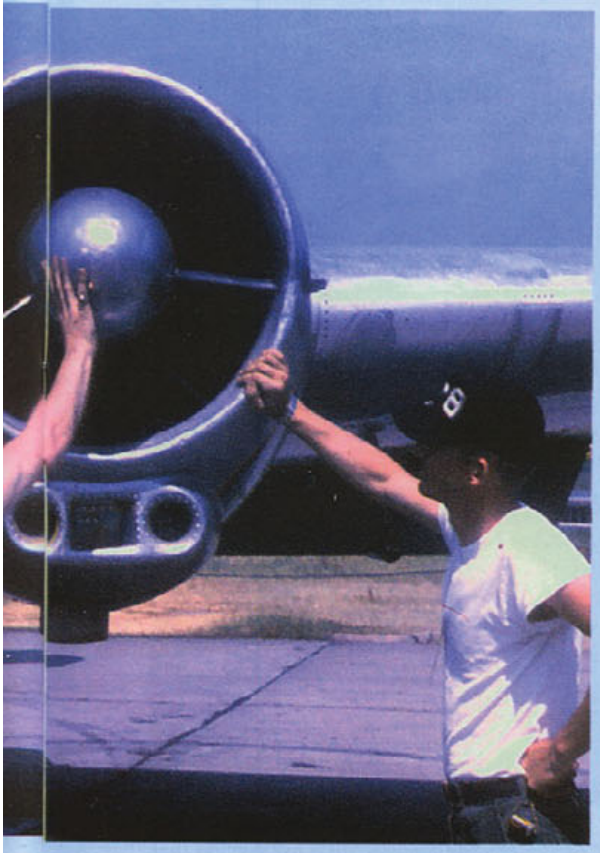
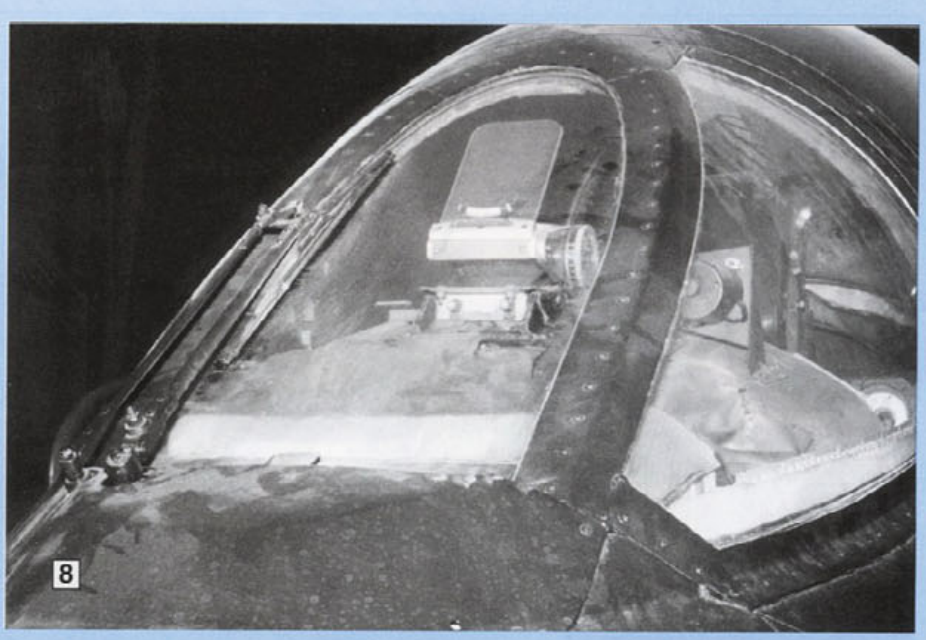
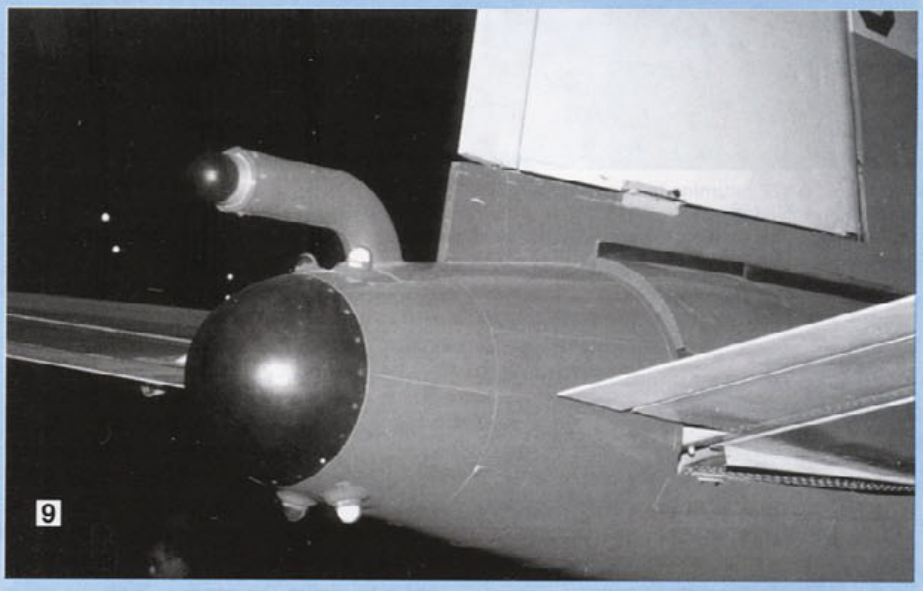
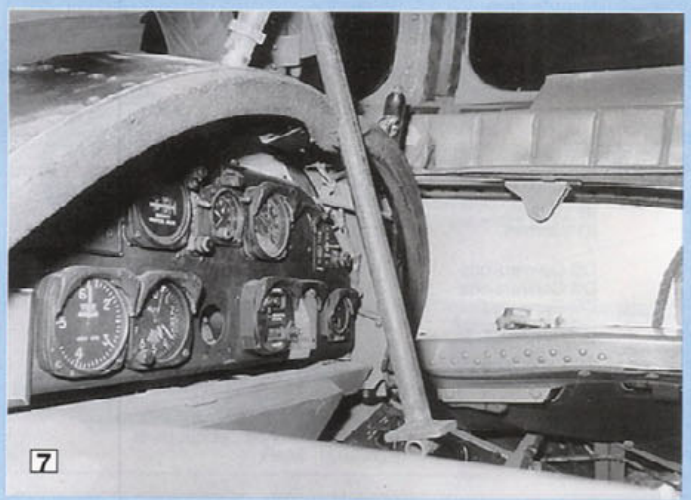
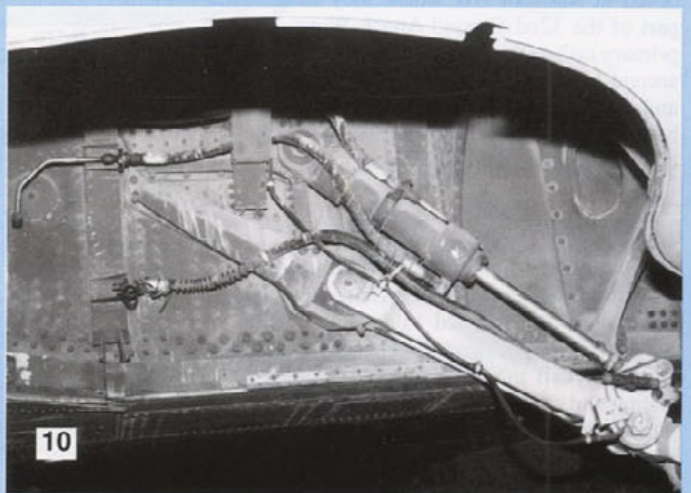






5. This view of the tail end of an EB-57B clearly shows the various aerials sited in this area of the airframe. 6. The main undercarriage legs as installed on the B-57 were as solidly built as their English Electric counterparts. Just check on the size of the main oleo leg. 7. The rear cockpit of the B-57 in which a number of the main instruments were duplicated as well as others to do with the aircraft's role either as an electronic countermeasures or reconnaissance aircraft. 8. The cockpit of the B-57B shows the difference between this and the RAF's Canberra. The centre part is made of armoured glass and the gunsight can be clearly seen through it. The B-57B was fitted with four 20mm cannon. 9. The extreme tip of the B-57's fuselage was frequenty used for the addition of radar, rearward looking warning devices or ECM aerials. This view shows two. The small bulbs above and below the equipment are navigation lights. 10. The main undercarriage legs fitted into the underside of the wings. This view of the undercarriage bay shows the various wires that are used for other equipment. When the wheel is retracted the inboard doors close activated by the part of the undercarriage leg shown here.





Above: An B-57E returning to base after a spoof mission over Vietnam.

Continued from page 37

Hyderabad. The B-57s were tasked with attacking this force with bombs, their top cover being the responsibility of F-104s and F-86s. The attack against the enemy trains was more than successful as the supply line was broken. After they had dropped their bombs the bombers returned to their targets and strafed them with their wing mounted guns totally blocking the route with wrecked vehicles and equipment. This action resulted in the Indian forces withdrawing.

For the next 16 years the 7th BS continued operating the B-57 which had been upgraded by the installation of maritime orientated avionics to extend their usefulness. On 27 December 1983 No.7 Squadron PAF was disbanded at its home base of Masroor AB and its few remaining aged B-57s were passed onto No.22 Squadron based at Faisal AB near Karachi. This transfer was short-lived as the Canberras were moved again, this time to join No.2 (Composite) Squadron based at Masroor AB where they became part of the 32nd Ground Attack Wing. The primary task of this unit was the provision of second-line services such as target towing and silent targets. This short but final fling by the PAF B-57s ended in 1987 when the type finally retired from service.

CLOSING YEARS

When the B-57 finally left USAF front-line service its career was not over as another vital role was assigned to it. Fitted with ECM jammers and pods which dispensed Window chaff their new role was aimed at testing and confusing the air defences of the United States. Much of the equipment was mounted in the bomb bay with aerials for the various systems being placed about the airframe. In order that the role of the EB-57B force was effective they would launch their attacks without warning at any time of the day or night. Operating the EB-57B was the responsibility of the 4677th DSES based at Hill AFB, Utah, and the 4713th DSES, based at Otis AFB, Mass, both being part of Aerospace Defence Command. A typical mission for an EB-57B crew began with a deployment to a base normally outside of the United States, frequently Bermuda or Canada. When the final briefing was given the spoof aircraft left to begin their mission. Once inside the range of the air defence radars the EWO started dispensing chaff in order to clutter the screens. With the radar screens confused the EWO began stage two which included spurious intercept information and system jamming to which more alloy strips are added. This whole panoply of confusion ended when a pre-arranged signal was transmitted by command.

After the end of the Vietnam War most of the remaining Canberras would be operated by the Air National Guard. One version that did linger in front-line service with USAF was that Cadillac of Canberras, the EB-57E. The final operator of the type was initially the 17th DSES who practised both quiet and noisy attacks upon Continental America. This unit had gained its inventory when both the 4713th DSES had deactivated in 1974 and the 4677th DSES had been re-numbered as the 17th DSES at Malmstrom AFB, Montana where it stayed active until June 1979. When the 17th had disbanded the target role passed onto the 117th DSES, 190th DSEG of the Kansas ANG and the 134th DSES of the 158th DSEG of the Vermont ANG. In 1978 the 190th DSEG was inactivated and was quickly followed by the 158th DSEG which relinquished its aircraft in 1981. One other unit to use the B-57 after the Vietnam War was the 117th TBS of the Kansas ANG which operated the B-57G until it was withdrawn from service in 1974.

Martin B-57 Canberra kits and accessories

Scale	Variant	Manufacturer	Reference	Remarks
Kits				
1:144	B-57B	Oz Mods	OZ14408	Vacuform kit
1:72	B-57/RB-57E	Airfix	AX05018	Complete kit
1:72	RB-57D	High Planes	HPM7239	Complete it
1:72	B-57A	High Planes	HPM7262	Complete kit
1:72	B-57B	Italeri	IT0144	Complete kit
1:72	B-57G Nighthawk	Italeri	IT0174	Complete kit
1:72	General Dynamics RB-57F Mach 2		MACH1872	Complete resin kit
1:48	B-57	ID Vacform	ID3253	Vacuform kit
1:48	RB-57	ID Vacform	ID4806	Vacuform kit
1:32	RB-57F	ID Vacform	ID3252	Vacuform kit
1:32	B-57	ID Vacform	ID3253	Vacuform kit
Conversions				
1:72	RB-57F	DB Conversions	DB16	Vacuform wings
1:72	EB-57E	DB Conversions	DB19	Air Intakes
1:72	RB-57D	DB Conversions	DB24	Vacform wings resin engines
1:72	B-57E	DB Convesions	DB27	Patricia Lynn nose
Decals				
1:72	B-57B	Superscale	SS72522	4677DSES; 345TBW
1:72	B-57B	Superscale	SS72523	8TFS; 461BW
Accessories				
1:72	B-57	Aeroclub	ABC013	Canopy for Airfix kit
1:72	B-57	Eduard	ED72339	Etched cockpit parts.
1:72	B-57	Eduard	EDXS071	Mask