

Lockheed Constellation

Though it initially suffered from protracted technical problems, the 'Connie' became the best-loved piston-engine airliner of all, and, in its maker's words, was 'Queen of the Skies'. Finally, while commercial Connies were slowly rotting away, military examples of a dozen species were working unnoticed around the clock.

In its day the Lockheed Constellation was the biggest, most powerful and most expensive of all airliners. But it avoided joining the list of unsuccessful giants, because at first its capacity was not so great as to frighten the airlines. The 'Connie', as it was affectionately known, was made possible by the development of engines of great power, and this power was used for speed, and to lift fuel for long range whilst cruising in pressurized comfort at high altitude. Once the basic type was established, Lockheed met the demand for greater capacity by introducing one of the first and greatest of all 'stretching' programmes to yield the 'Super Connie', seating up to 100 or more.

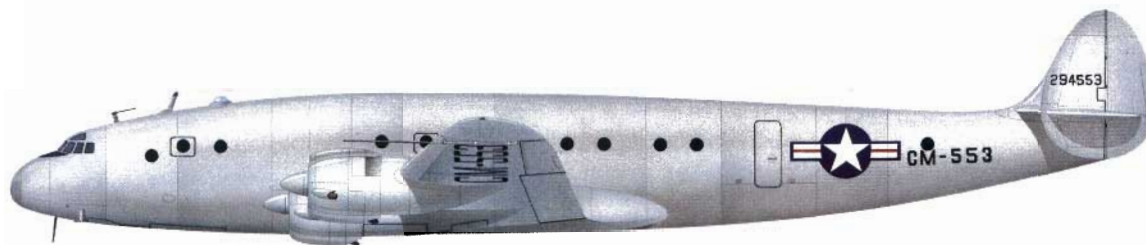
But in 1938 this could not be foreseen. On 23 June of that year the McCarran Act had transformed US commercial aviation, and the manufacturing industry had rationalized into the same three names that dominate it today, Boeing, Douglas and Lockheed. The first two had already built the big four-engine DC-4 and pressurized Model 307 Stratoliner, but Lockheed was overloaded with small twins and the military Hudson and P-38, and its promising Excalibur remained a succession of mock-ups. This was tough, because

Lockheed had a strong leaning towards powerful, fast aircraft, and had pioneered pressure cabins with the XC-35 flown in May 1937. Nothing much could be done until suddenly on 9 June 1939 the company was visited by the famed Howard Hughes, who had secretly bought most of the stock of TWA, and Jack Frye, whom he had appointed president.

Hughes had lately given Lockheed a giant boost by flying a Model 14 airliner around the world in record time. TWA was in severe trouble with money and route competition, and Hughes urged the development of a new super-luxury transport that could fly nonstop coast-to-coast across the continental USA. The specifications sounded out of this world (empty weight 52,300 lb/24132 kg, four 2,200-hp/1641-kW engines, cruising speed over 300 mph/483 km/h and the ability to fly from New York to London nonstop),

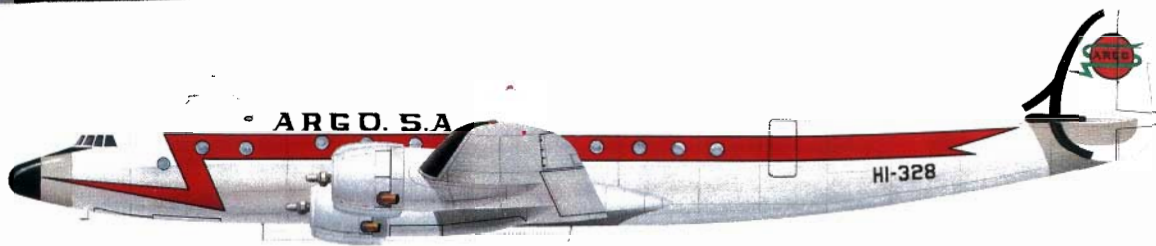
Known to Lockheed as the Model 749-79-38, the C-121A was a properly designed military transport, the C-69s having mainly been converted airliners. USAF no. 48-616 is seen here in MATS (Military Air Transport Service) markings, flying as a PC-121A passenger aircraft. Engines were 2,500-hp (1864-kW) R-3350-75 Duplex Cyclones.





US Army Air Force no. 42-94553 was a Model 049-39-10, ordered pre-war by TWA but built as a C-69-5. It is shown in May 1946 finish without olive-drab paint, and with the 'buzz number' CM-553. Later it was struck off the Army strength and sold to TWA, with civil registration N52414. All early models had circular porthole-type windows.

HI-328, registered to Aerolineas Argo SA of the Dominican Republic. An L-749A, she served with several operators before going to Dominica, which was a final stronghold of old Connies until Argo – an all-cargo airline – ceased flying in 1983.



and all Lockheed's rivals gave Hughes a thumbs-down. But Lockheed's Bob Gross called in his top designers, Hall L. Hibbard and Clarence L. 'Kelly' Johnson, and said 'Come up with something'. Long meetings took place at a secret Hughes place on Romaine Street, Hollywood, and before the end of the year a formal meeting took place at which Hughes asked the price and was told \$425,000. He rocked back and forth like an Indian at a pow-wow and said 'Hell, TWA can't pay, the damn airline's broke. Go ahead and build 40, I'll have to pay for them myself.'

C-69 for the US Army

Wartime pressures delayed the Model 49 Constellation, but eventually Lockheed hired pilot Eddie Allen to take the first one aloft on 9 January 1943. No commercial production was allowed after Pearl Harbor, and TWA's idea of a commercial lead with a super dream ship evaporated as PanAm came in alongside; and in the event all production went to the US Army. But even in olive drab the C-69, as it was now called, was quite something. Its wing was a scaled-up version of the wing of the P-38, with giant area-increasing Fowler flaps. The fuselage was curved like the body of a fish and ended in a triple tail. The circular-section cabin seated 64 passengers, though Hughes was bemused that the US Army could take out all the luxury and still contrive to make the C-69 heavier than the Model 49. All flight-control surfaces were hydraulically boosted. Not least, the height of the Constellation off the ground was unprecedented. In two respects, however, the civil registered NX67900, or Lockheed ship no. 1961, was conventional: it had normal cockpit windows instead of the once-planned perfectly streamlined nose, and the engines were also fairly conventional instead of being in perfectly streamlined nacelles with reverse-flow cooling from inlets in the leading edges.

During the war the USAAF received 22 Constellations, comprising nine ex-TWA and 13 of a contract for 180 signed in 1942. At VJ-Day the military contract was cancelled. Lockheed shut down the Burbank plant for five days to plan its future. It almost decided to start again with an even newer Constellation, but finally elected to buy back surplus government tooling, parts, materials and unfinished C-69s. This resulted in the commercial Model 049 having an 18-month lead over the DC-6 and Stratocruiser, and even

more over the Republic Rainbow, and within nine days 103 Constellations valued at \$75.5 million had been ordered by eight airlines. TWA at last got the first of 27 Model 049s in November 1945. CAA certification followed on 11 December. Commercial services followed in early February 1946, TWA flying the New York-Paris and PanAm the New York-Bermuda routes.

The USAAF sold its surplus C-69s to airlines in 1946, and the in-service record built up so fast that by July 1946 over 200 million passenger miles had been flown without anyone suffering injury. This was despite numerous engine fires and both engine and propeller failures, but on 11 July 1946 a TWA training flight crashed at Reading, Pennsylvania, because the pilots could not see from the smoke-filled cockpit. A six-week grounding followed, in which 95 modifications were made to the powerplant and systems. There was light at the end of the tunnel (and the DC-6 and other rivals were grounded too): on 19 October 1946 the first definitive post-war Model 649 took the air, so luxurious and with such good air-conditioning and soundproofing it was called the 'Gold Plate Connie'. Eastern worked on the specification and was first to use it, one of its features being a Speedpak external cargo pod under the belly.

Post-war civil success

Ten airlines then bought nearly 100 Model 749s in which 2,700-hp (2014-kW) engines enabled gross weight to rise to 102,000 lb (46267 kg), with a long-range tank in each outer wing to give an extension of range of 1,000 miles (1609 km) without any reduction in payload. Payload/range was further enhanced by the Model 749A at 107,000 lb (48535 kg), with Curtiss paddle-blade propellers. The USAF again adopted the Constellation, buying 10 Model 749s as C-121s of various sub-types, two of which were General MacArthur's *Bataan* and General Eisenhower's *Columbine*. Later another of this batch (48-610) was used as *Columbine II* when Eisenhower became President. The US Navy, which in 1945 had used two R70-1 transports off the US Army line, purchased two Model 749s as its first dedicated radar picket (AEW) aircraft, initially designated PO-1W and later WV-1. Initially flown in June 1949, these were the first aircraft in the world bought from the start as high-flying radar stations, if one discounts modified single-engine Grumman TBM-3

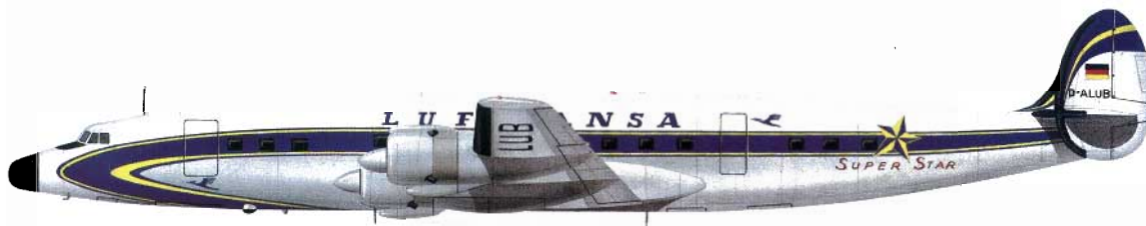


This historic photograph was taken at Burbank on 9 January 1943 when the very first Constellation, painted in US Army olive drab, took off for the first time. It was to suffer its fair share of technical problems, but all concerned recognized that it opened up a new plateau in air transport range, speed and comfort.



The final variant of the Super Constellation was the L-1049H, which featured a mixed passenger/cargo configuration with rapid role conversion as a prime feature.

KLM Royal Dutch Airlines was one of the first operators of the Turbo-Compound engined L-1049C, which was placed in use on the North Atlantic in August 1953. Just a year later KLM took delivery of this tip-tanked L-1049G, PH-LKE, which could fly the Amsterdam-New York route much better with less frequent stops for refuelling.



With a maximum range of 4020 miles (6469 km), uprated Wright TC-18-DA3 Turbo-Compound engines and an increased cabin length of 56 ft (17.06 m), the L-1049G proved the most successful Super Constellation model in sales terms. Shown here is Lufthansa's D-ALUB. The airline flew its first intercontinental service from Hamburg to New York on 8 June 1955.

Avengers. Their giant radars were served by aerials (antennae) above and below, but despite the grotesque appearance the addition of extra height to the fins resulted in a very tractable aircraft, and the success of these first two examples led to massive orders of no fewer than 27 distinct subsequent versions for various electronic purposes.

The unexpected USAF and USN sales helped carry the commercial line through a bad patch, and spurred Lockheed into the striking 'stretch' which turned the Constellation into the Model 1049 Super Constellation. By 1950 the whole programme, under Carl M. Haddon, was poised for its second generation, backed by Lockheed Aircraft Service which had begun at Idlewild in 1949 spurred by the Berlin Airlift, in which C-121s flew almost 6 million passenger miles from Westover AFB to Rhein-Main. But the big news was the L-1049, in which Hibberd injected rational sense with a straight passenger tube of constant section, it having been realized that an airliner in which the body section varied continuously was a mistake.

The first L-1049, the old no. 1961 rebuilt, flew on 13 October 1950. There were many minor changes, but the most obvious one apart from the 18 ft 4 in (5.59 m) extra length was the switch from port-holes to rounded square windows, removing what had become another outdated feature despite the better fatigue resistance of rings to squares. TWA was behind the Super Constellation, though it was pipped to the post by Eastern which got the new transport, able to seat 99, on the Miami run on 15 December 1951. The largely new engine installations worked well, as did the improved de-icing systems and the larger cockpit windows, integrally stiffened wing skins machined in the newly opened 'Hall of Giants' at Burbank, and better environmental systems.

The L-1049B was a cargo model with integrally stiffened floor and two large loading doors. Lockheed was requested by the US Navy to switch to the complex new Wright Turbo-Compound engine derived from the existing R-3350 used in all previous Constellations,

and the 3,250 hp (2425 kW) available from each engine not only promised more speed but also a jump in gross weight to 133,000 lb (60329 kg), representing a further great advance in payload/range. Though the Turbo-Compound engine predictably took a long time to mature, it also totally removed the slight sluggishness which had crept into the original Model 1049, which cruised at barely 300 mph (483 km/h). In addition to 57 US Navy R7V-1s, of which 32 were transferred to the USAF as C-121Gs, Lockheed sold 33 C-121Cs to the USAF. The C121C was cleared to 135,000 lb (61236 kg), and the others introduced the uprated 3,500-hp (2611-kW) R-3350-34 engine and could take off at 145,000 lb (65772 kg). Subsequently the USAF and US Navy variants of the Model 1049 far outnumbered the commercial versions, as the variants list shows.

Comfort and capability

Seaboard & Western bought a commercial version of the Model 1049B, but the passenger version was the Model 1049C, first put into service by KLM on the New York-Amsterdam route in August 1953. Increasingly the airliner models were fitted with weather radar, which added 3 ft (0.91 m) to the length, as in the military variants. This helped improve passenger comfort, especially on US coast-to-coast trips, and such was the capability of the Model 1049C that from 19 October 1953 TWA at last opened a nonstop service between Los Angeles and New York, rivalling that opened by American with the similarly powered DC-7. This was a time when the British de Havilland Comet was blazing the trail of the airline jet. The Constellation's Mach 0.58 was less impressive, but history was to show that the US industry, greatly aided by the unfortunate

One of the last European airlines to continue flying the Super-G was Iberia, the national airline of Spain (though it withdrew them long before its last cargo DC-4!). EC-AMP is shown on test near Burbank prior to delivery in 1956. One can almost imagine the deep rumble of those Turbo-Compound engines and mighty propellers!



The World's Greatest Aircraft

collapse of the original Comet programme, was able to fend off this new competition with its fundamentally old-generation piston-engine machines, with the Model 1049 in the forefront. Unit price, typically \$1 million for a Model 749, rose to \$1.25m with the first Model 1049s, and more than doubled with later Model 1049 versions.

The Model 1049D was an improved cargo aircraft, and the Model 1049E a corresponding passenger version, but most Model 1049E aircraft were actually completed as Model 1049Gs, which were among the most important of all commercial versions. Improved climb ratings from the R-3350-DA3 Turbo-Compound enabled gross weight to reach 137,500 lb (62370 kg), which among other things enabled 600-US gal (2271-litre) tip tanks to be added. The Model 1049G entered service with Northwest in January 1955. A convertible passenger/cargo model was the Model 1049H, of which 54 were built. The very last Constellation was an L-1049H delivered in November 1958.

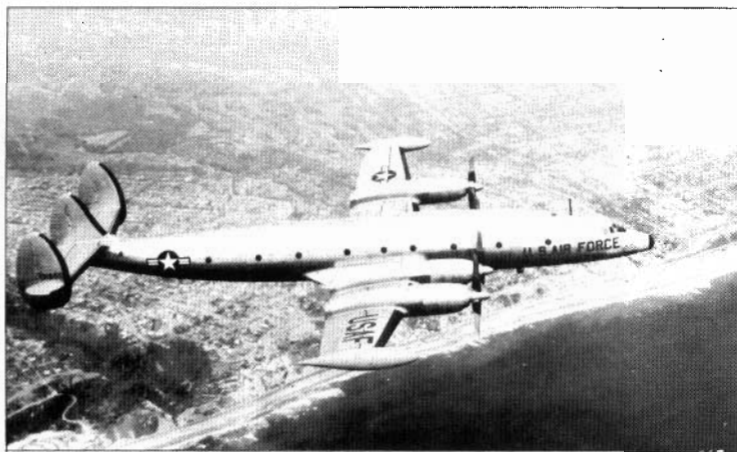
Piston-engine pinnacle

Before then, one final model had been designed, flown and built in quantity; but the quantity was small, and this was the only version to prove unprofitable to Lockheed, because its development cost over \$60 million. The Model 1649A Starliner was launched in 1954 to meet the severe competition of the DC-7C Seven Seas on ultra-long routes, especially the nonstop North Atlantic services. No Model 1049 was really a nonstop Atlantic aircraft (certainly not westbound) and TWA for the last time decided to push Lockheed into a further development of what had by this time become an old aeroplane. In going for long range Lockheed capitalized on the one thing the Super Constellation could offer in competition with the new Comet 3: lower fuel consumption, though of course it was 115/145 grade gasoline. Fitting Turbo-Compounds had inevitably resulted in severe noise and vibration in an airframe originally planned for about half this power, and it was ultimately decided to out-do Douglas by designing a totally new wing, of great span and high aspect ratio, which would give unrivalled cruising efficiency, house more fuel and enable the engines to be moved well away from the fuselage to reduce noise and propeller vibration.

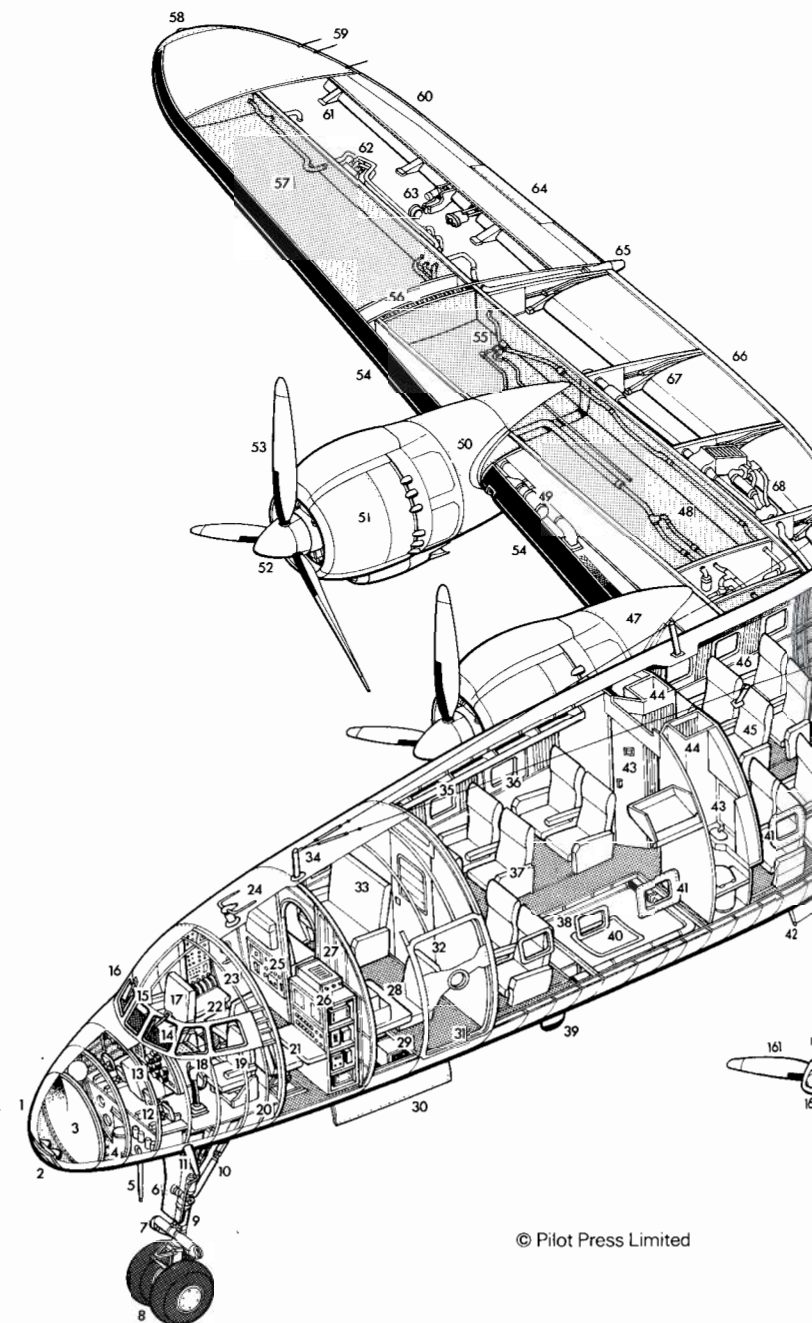
The Model 1649A first flew on 10 October 1956. It was a beautiful aircraft, and can be regarded as the final pinnacle reached by the piston-engine airliner. The wing box, which had acute dihedral from the roots, was wholly skinned in gigantic machined planks. The body was slightly stretched, and the redesigned nacelles housed the most powerful civil piston engines ever used, driving Hamilton Standard three-blade propellers with synchrophasers to keep their speeds exactly synchronized. TWA, which called the Model 1649 the Jetstream, began services on the North Atlantic on 1 June 1957, but by then the jet era was only weeks away and at last the old Constellation had begun to lose its once powerful appeal. Only 44 of this vastly improved final version were sold, and all were withdrawn in the 1960s while basically older models kept at work, several occasionally trucking odd cargoes around the Caribbean and Dominica.



Acting as relay stations for signals from ground sensors in Project 'Igloo White', 30 ex-USN EC-121Ks and EC-121Ps proved invaluable to the US Air Force's intelligence operations during the Vietnam war.



Powered by the Pratt & Whitney T34-P-6 turboprop engine, four Super Constellations were procured by the US Navy as R7V-2s. Two aircraft, redesignated YC-121Fs, were transferred to the US Air Force for testing.



This Lockheed L-1049G served for 10 years from 1955 with Air India as VT-DJX on the airline's trunk routes. Eight Super-Gs were then passed on to the Indian Air Force, where for a further decade they flew not only transport but also maritime reconnaissance missions with No. 6 Sqn. Radar was retained, but the tip tanks were removed.

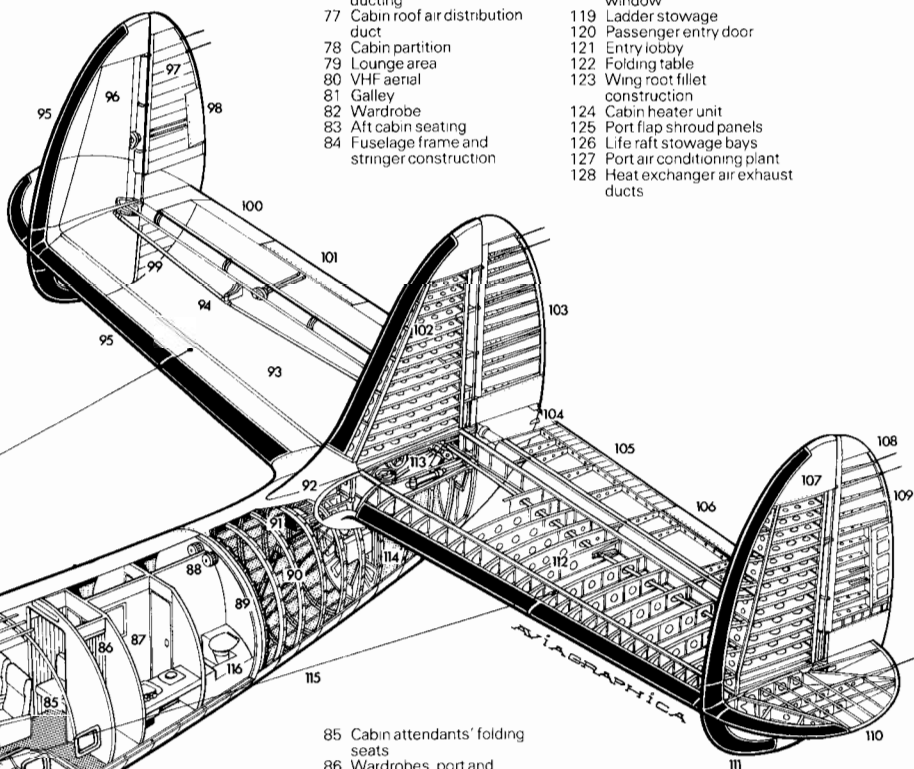


Lockheed L-1049C Super Constellation cutaway drawing key

- 1 Nose cone
- 2 Landing and taxiing lamps
- 3 Front pressure bulkhead
- 4 Hydraulic brake accumulator
- 5 Radio mast
- 6 Nosewheel leg door
- 7 Steering jacks
- 8 Twin nosewheels
- 9 Nosewheel leg strut
- 10 Retraction linkages
- 11 Pitot tube mast
- 12 Rudder pedals
- 13 Instrument panel
- 14 Instrument panel shroud
- 15 Windscreen wipers
- 16 Windscreen panels
- 17 Co-pilot's seat
- 18 Control column
- 19 Pilot's seat
- 20 Flight deck floor level
- 21 Radio operator's station
- 22 Flight engineer's station
- 23 Starboard crew door
- 24 VOR aerial
- 25 Engineer's instrument panel
- 26 Radio racks
- 27 Cockpit bulkhead
- 28 Navigator's chart table
- 29 Underfloor battery bay
- 30 Nosewheel doors
- 31 Forward entry door
- 32 Cabin bulkhead
- 33 Crew rest area
- 34 Radio aerial mast
- 35 Overhead luggage racks
- 36 Starboard emergency exit window

- 37 Forward cabin seating
- 38 Forward underfloor freight hold, total freight hold volume 728 cu ft (20.61 m³)
- 39 Radio altimeter
- 40 Ventral freight door
- 41 Port emergency exit windows
- 42 Ventral ADF sense aerial
- 43 Toilet compartments, port and starboard
- 44 Wardrobes
- 45 Main cabin four-abreast seating
- 46 Cabin wall trim panels
- 47 Starboard inner engine nacelle
- 48 Starboard wing integral fuel tank, total fuel capacity 6,550 US gal (24760 litres)
- 49 Supercharger oil cooler
- 50 Starboard outer engine nacelle
- 51 Detachable engine cowling panels
- 52 Spinner
- 53 Hamilton Standard three-bladed propeller
- 54 Leading edge de-icing boots
- 55 Fuel system piping
- 56 Outer wing panel joint rib
- 57 Outboard integral fuel tank

- 75 Air conditioning system overhead ducting
- 76 Heating system overhead ducting
- 77 Cabin roof air distribution duct
- 78 Cabin partition
- 79 Lounge area
- 80 VHF aerial
- 81 Galley
- 82 Wardrobe
- 83 Aft cabin seating
- 84 Fuselage frame and stringer construction
- 117 Rear underfloor freight hold
- 118 Rear cabin emergency exit window
- 119 Ladder stowage
- 120 Passenger entry door
- 121 Entry lobby
- 122 Folding table
- 123 Wing root fillet construction
- 124 Cabin heater unit
- 125 Port flap shroud panels
- 126 Life raft stowage bays
- 127 Port air conditioning plant
- 128 Heat exchanger air exhaust ducts



- 58 Starboard navigation light
- 59 Static dischargers
- 60 Starboard aileron
- 61 Aileron balance weights
- 62 Fuel venting system piping
- 63 Aileron control hydraulic booster
- 64 Aileron tab
- 65 Fuel jettison pipe
- 66 Starboard Fowler-type flap
- 67 Flap guide rails
- 68 Starboard air conditioning plant
- 69 Fuselage centre section construction
- 70 Wing/fuselage attachment main frames
- 71 Centre section bag-type fuel tanks
- 72 Central flap control motor
- 73 Cabin floor panels
- 74 Fresh-air distribution ducting

- 85 Cabin attendants' folding seats
- 86 Wardrobes, port and starboard
- 87 Port and starboard washrooms
- 88 Cabin pressurization valves
- 89 Rear pressure bulkhead
- 90 Tailcone construction
- 91 Elevator mass balance weight
- 92 Fin/tailplane fillets
- 93 Starboard tailplane
- 94 Rudder control rods
- 95 Leading edge de-icing boots
- 96 Starboard fin
- 97 Fabric covered rudder
- 98 Rudder trim tab
- 99 Lower rudder segment
- 100 Starboard elevator
- 101 Elevator trim tab
- 102 Centre fin construction
- 103 Centre rudder
- 104 Tail navigation light
- 105 Port elevator construction
- 106 Elevator tab
- 107 Port fin construction
- 108 Static dischargers
- 109 Port rudder construction
- 110 Tailplane tip fairing
- 111 Leading edge de-icing boots
- 112 Tailplane construction
- 113 Rudder and elevator hydraulic boosters
- 114 Tailplane attachment frame
- 115 HF aerial cable
- 116 Aft toilet compartments, port and starboard

- 129 Port Fowler-type flap
- 130 Flap shroud ribs
- 131 Fuel jettison pipe
- 132 Aileron tab
- 133 Port aileron construction
- 134 Static dischargers
- 135 Wing tip construction
- 136 Port navigation light
- 137 Leading edge de-icing boots
- 138 Port outboard fuel tank bay
- 139 Outer wing panel main spar
- 140 Outer wing panel joint rib
- 141 Rear spar
- 142 Wing rib construction
- 143 Engine nacelle construction
- 144 Air conditioning system turbine
- 145 Oil cooler air duct
- 146 Oil cooler
- 147 Engine mounting ring
- 148 Carburettor intake duct fairing
- 149 Twin mainwheels
- 150 Leading edge nose ribs
- 151 Front spar
- 152 Wing stringer construction
- 153 Main undercarriage leg strut
- 154 Retraction linkage
- 155 Main undercarriage wheel well
- 156 Mainwheel doors
- 157 Engine firewall
- 158 Exhaust collector ring
- 159 Wright R-3350-DA1 Turbo-Compound, 18-cylinder two-row radial engine
- 160 Propeller hub pitch change mechanism
- 161 Hamilton Standard three-bladed propeller
- 162 Carburettor intake duct
- 163 Engine oil tank
- 164 Main undercarriage mounting ribs
- 165 Inner wing integral fuel tank
- 166 Leading edge construction
- 167 Hydraulic reservoir
- 168 Cabin fresh air intake

Lockheed Constellation

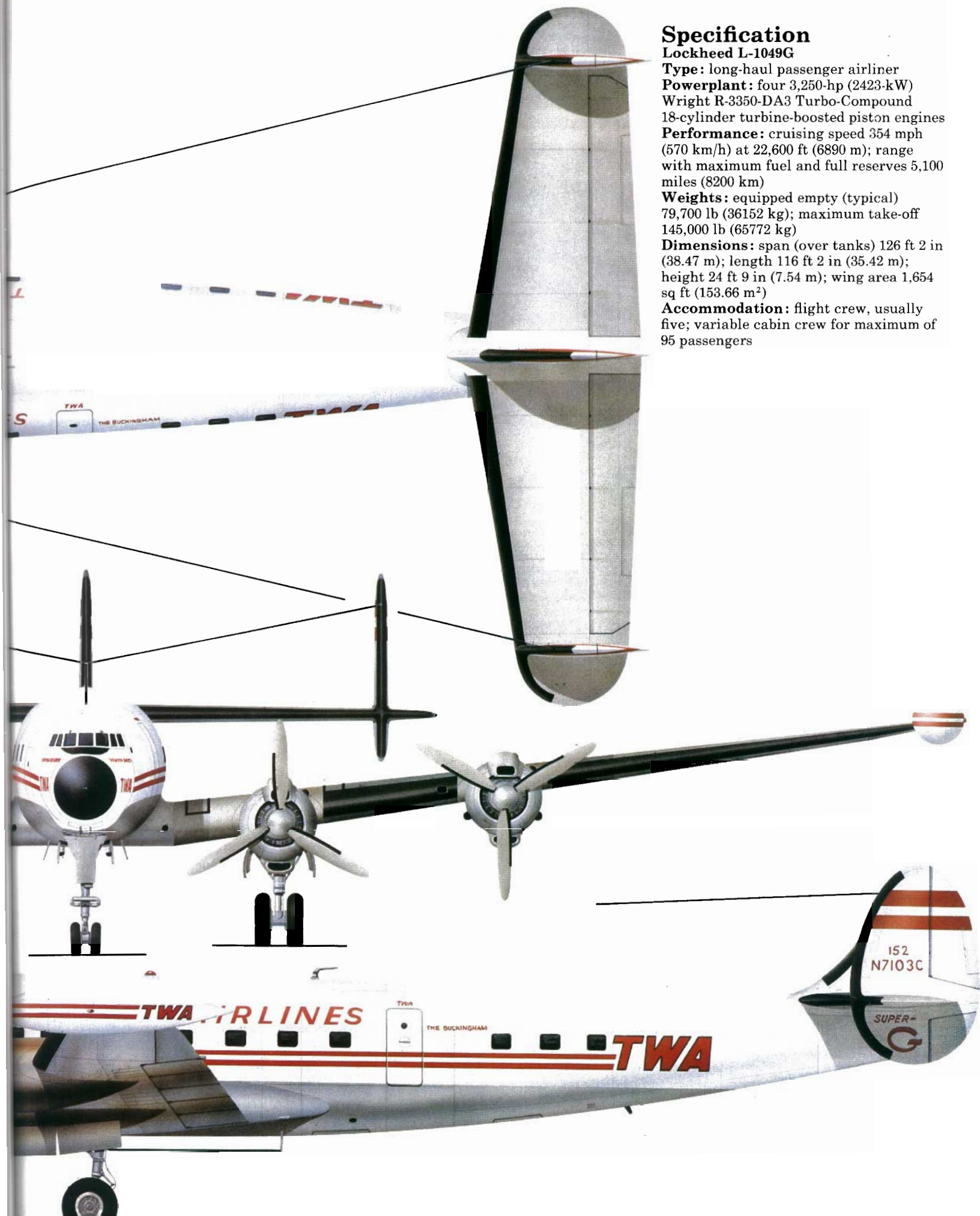
In its day – it first flew in December 1954 – the L-1049G, or 'Super G', was the greatest airliner in the world. Structural changes enabled it to carry large tip tanks (tested on the original company-owned L-1049 prototype) which combined with the Turbo-Compound engines to give the greatest range of any Constellation up to that time, despite capacity for 71 first-class or 95 'coach' passengers. One of the chief operators of the 99 examples built of this model was TWA, which had sponsored the original Constellation before World War 2. With these fine aircraft the airline pioneered transatlantic and other long-haul services including its luxury Ambassador class, patronized chiefly by businessmen and using special private suites at the airports. In the plan view the dark apertures above the trailing edge between the engines are the air-conditioning heat exchanger exhausts. Behind the black line of the rear spar just inboard of these can be seen the big doors over the life raft bays. The black bands on the leading edges are the pulsating rubber de-icers.



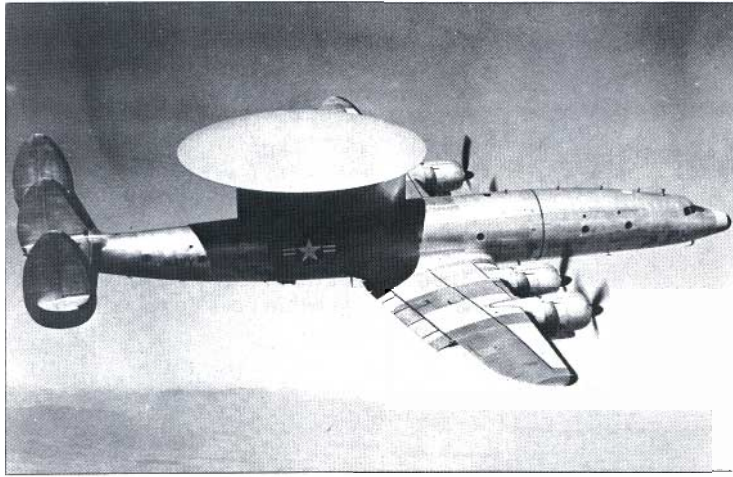
Specification

Lockheed L-1049G

Type: long-haul passenger airliner
Powerplant: four 3,250-hp (2423-kW) Wright R-3350-DA3 Turbo-Compound 18-cylinder turbine-boosted piston engines
Performance: cruising speed 354 mph (570 km/h) at 22,600 ft (6890 m); range with maximum fuel and full reserves 5,100 miles (8200 km)
Weights: equipped empty (typical) 79,700 lb (36152 kg); maximum take-off 145,000 lb (65772 kg)
Dimensions: span (over tanks) 126 ft 2 in (38.47 m); length 116 ft 2 in (35.42 m); height 24 ft 9 in (7.54 m); wing area 1,654 sq ft (153.66 m²)
Accommodation: flight crew, usually five; variable cabin crew for maximum of 95 passengers



US Navy BuNo. 141325 was built as one of the 124 WV-2 airborne early-warning (radar picket) platforms, but after operating in the livery shown with Squadron VW-13 it was converted as an EC-121K, with minor changes, and then as an EC-121D. At one time in the late 1960s it was an EC-121P with submarine detection equipment.



The first modern airborne early-warning aircraft to fly, with rotating rotodome-type aerial arrays, was this WV-2E of the US Navy first flown in 1956, with the new AN/APR-82 surveillance radar. In 1962 it was redesignated EC-121L, by which time several other rotodome-equipped C-121s were flying. They led to today's Boeing E-3A Sentry.

Far more important in the post-1960 era was the profusion of technically intriguing military versions, packed with unusual devices mainly of an electronic nature, which thundered faithfully all over the globe until 1980 despite concerted efforts made from 1975 to eliminate everything calling for 115/145 gasoline. In the 1960s Super Constellations of the USAF and US Navy flew more than 600,000 hours, though by this time the basic type ceased to appear in books on US military aircraft. Total production of all Constellation models was 856 (one XC-69, 233 Constellations, 578 Super Constellations and 44 Starliners).

On 15 April 1969 a US Navy 'Connie' piloted by Lieutenant Commander James Overstreet was attacked by two North Korean

MiG-17 fighters over the Sea of Japan and shot down. The loss of EC-121M no. 135749 from electronics squadron VQ-1, and of all 31 American crew members – the only loss in anger of a US military Constellation – highlights the special role of this aircraft type in reconnaissance, intelligence-gathering, and airborne early warning (AEW).

This role was first undertaken when the ubiquitous 'old 1961' was converted – again! – by Lockheed/Burbank for trials as an AEW platform. Modifications to accommodate radar and other gear gave the Connie a tall, narrow dorsal hump and a large under-fuselage bulge. This configuration was first seen operationally on the US Navy's PO-1W and PO-2W (later designated WV-1 and WV-2) weather-reconnaissance and AEW machines based respectively on the 749 and 1049 airliners.

Later, other duties were added to the AEW role, including electronic eavesdropping and countermeasures. The variety of humps, bumps and bulges protruding from various 'spook' Connies in the C-121 series became, itself, an encyclopedia-length subject. A one-off variant, the WV-2E, later called EC-121L, carried its antenna in a saucer-like disc evocative of today's Boeing E-3A Sentry.

In these Constellations, large crews could journey for up to 30 hours far from the Fleet or from shore, relief crews replacing each other while searching for air or sea threats. Initially, with the purpose of extending the range of ground and ship radars, USAF Constellations were used off American coasts by the Air Defense Command. In Vietnam, under the 'College Eye' programme, USAF Constellations stood off the enemy coast and reported MiG activity to endangered US combat pilots. In South Vietnam, the USAF's EC-121R, camouflaged and devoid of bulges, copied enemy radio transmissions for intelligence. More than a dozen designations were eventually applied to 'spook' Connies (see Variants list), and today one of the most beautiful of these preserved machines is the US Navy's EC-121K no. 141292, from squadron VAQ-33, on display at the Air and Space Museum in Florence, South Carolina.

Lockheed Constellation variants

Model 049-39-10: pre-war TWA/PanAm aircraft with four 2,200-hp (1641-kW) R-3350-35 after being taken over by USAAF prior to completion, first aircraft (Lockheed no. 1961) completed as **XC-69** in olive drab, civil registration NX67900, later NX25600, later AAF 43-10309; remaining aircraft **AAF C-69-1** (43-10310/10317) and **C-69-5** (42-94549/94561); total 22
C-69C: conversion of 294550 as VIP transport, later **ZC-69C**
XC-69E: conversion of first prototype with 2,000-hp (1492-kW) R-2800 Double Wasp engines
Model 049 Constellation: initial new-build commercial model with 2,200-hp (1641-kW) R-3350-BA1 engines, gross weight 86,000 lb (39010 kg), later 90,000 lb (40824 kg) and later 96,000 lb (43546 kg); nos 2023/88, total 66
R70-1: initial US Navy counterpart of Model 049-46, used by VPB-101, BuAer nos not assigned
Model 649: commercial transport with 2,500-hp (1865-kW) R-3350-BD1 engines, gross weight 98,000 lb (44453 kg); total 14, later brought up to L-749 standard
Model 749: long-range tanks in outer wings; gross weight 105,000 lb (47628 kg); the **Model 749A** had stronger spars and main logs; gross weight 107,000 lb (48535 kg); total 111
C-121A (Model 749A-79-38): 2,500-hp (1865-kW) R-3350-75 engines as USAF passenger transports, (48-609/617); at one time designated **PC-121A**, for passenger transport, total 9
VC-121A: VIP conversions, 48-610 as *Columbine II*, 48-613 as *Bataan* and 48-614 as *Columbine I*
VC-121B: special long-range VIP aircraft (48-608); total 1
Model 1049 Super Constellation: stretched version with 2,700-hp (2014-kW) R-3350-CA1 engines, gross weight 120,000 lb (54432 kg), prototype was conversion of no. 1961, redesignated N6201C; square windows

retained but tip tanks deferred until the Model 1049G; total 24 (nos 4001/4024)
R7V-1: US Navy **Model 1049B**, first with 3,250-hp (2425-kW) R-3350-91 Turbo-compound engines; weather radar lengthened nose 3 ft (0.91 m); total 51 (BuAer nos 128434/128444, 131621/131629, 131632/131659, 140311/140313); see C-121 G and C-121 J
PO-1W: see WV-1
WV-1: first AEW radar picket version, based on Model 749, height-finder radar above fuselage, plan surveillance radar below, crew 22; BuAer nos 124437/124438, total 2 and ordered as PO-1Ws
WV-2: production AEW model, later named **Warning Star**; based on Model 1049, 3,400-hp (2536-kW) R-3350-34 or -42 Turbo-Compounds, improved radars and data links, crew 26; BuAer nos 126512/126513, 128323/128326, 131387/131392, 135746/135761, 137887/137890, 141289/141333, 143184/143230, 145924/145941, total 142
WV-2E: conversion of BuAer no. 126512 with APS-82 radar using rotating dish 'rotodome'
WV-2Q: conversions (16-plus) as high-power ECM warning, D/F and jamming platforms
WV-3: weather reconnaissance variant, also called **Warning Star**, same basic airframe as WV-2 but totally different interior and equipment, no tip tanks, crew 8; BuAer nos 137891/137898, plus conversion of 141323, total 9; became WC-121N, but two to USAF as EC-121R
R7V-2: US Navy **Model 1249** high-speed transports to evaluate turboprop propulsion, restressed airframe for high speeds (437 mph/703 km/h); four P&W YT34-P-12A driving broad paddle-blade propellers, BuAer nos 131630/131631, 131660/131661, total 4
C-121C: standard USAF long-haul passenger transport for MATS derived from Model 1049, weather radar, 3,500-hp (2611-kW) R-3350-34 Turbo-Compounds; 54-151/183, total 33

EC-121C: see RC-121C
JC-121C: two C-121C (54-160, 54-178) and one RC-121C (51-3841) converted as systems (mainly electronics) test aircraft
RC-121G: first USAF AEW radar picket version, based on C-121C airframe with dorsal and ventral radars similar to WV-2; 51-3836/3845, total 10, in 1962 became EC-121C
TC-121C: nine RC-121Cs converted as AEW radar trainers; subsequently became EC-121C
VC-121G: conversions as VIP executive transports total 4 (54-167/168, 54-181/182)
EC-121D: see RC-121D
RC-121D Warning Star: improved long-range AEW&C (airborne early warning and control) version, tip tanks and other changes, equipped second AEW&C Wing (551st), basis for many other versions; 52-3411/3425, 53-533/556, 53-3398/3403, 54-2304/2308, 55-118/139, total 72; most became **EC-121D**
VC-121E: ex-USN R7V-1 (131650) transferred to USAF as 53-7885 as Presidential *Columbine III*
VC-121F: last two R7V-2 transferred to USAF as 53-8157/8158, later re-engined with T34-P-6
TC-121G: transferred USN R7V-1s to USAF for MATS use, renumbered 54-4048/4049; total 32
TC-121G: conversions as crew trainers; 54-4050/4052 and 4058, total 4
VC-121G: VIP conversion of 54-4051
EC-121H: rebuild of 551st AEW&C Wing EC-121Ds with SAGE data-links, large airborne computer, new nav aids and other equipment, total 42
C-121J: transfer of C-121G (54-4079) back to USN as 140313; later became NC-121K
EC-121J: updates of EC-121Ds with extra equipment (classified); 52-3416 and 55-137, total 2
EC-121K: redesignation of WV-2
YEC-121K: conversion of WV-2 128324 for classified 'Ferret' Elint
JC-121K: conversion of EC-121K 143196 for

classified US Army test programme(s)
NC-121K: conversions (21-plus) for special tests, including C-121J and EC-121K 145925 for Project 'Magnet' mapping Earth's field
EC-121L: redesignation of WV-2E
EC-121M: redesignation of WV-2Q
WC-121N: redesignation of WV-3
EC-121P: conversions (13-plus) of EC-121K with ASW sensors and special overwater nav aids, 143184, 143189, 143199, 143200 to USAF with numbers as before omitting initial 1
JEC-121P: four of above transfers (189/199/200) later on special USAF test
EC-121Q: conversions (unknown number) of EC-121Ds with augmented and updated AWACS systems
EC-121R: conversions (total 30) for Project 'Iglou White' in Vietnam, serving as airborne data-relay stations (67-21471/21500)
EC-121S: near-total rebuild of five C-121Cs (54-155, 159, 164, 170, 173) as EC-121Q
EC-121T: classified conversions (25-plus) of EC-121D, H and J as Elint electronic intelligence platforms
Model 1049C: first commercial model with Turbo-Compounds (3,250-hp/2425-kW R-3350-DA1), strengthened wing, extra fuel; total 49
Model 1049D: cargo version of Model 1049C, total 4
Model 1049E: improved passenger model; total 18
Model 1049G: major upgrade of commercial aircraft with DA3 engines, tip tanks and other improvements; total 104
Model 1049H: corresponding long-range restressed cargo aircraft; total 53
Model 1649 Starliner: ultra-long-range model with new long span wing, slightly stretched body and many other improvements; total 44