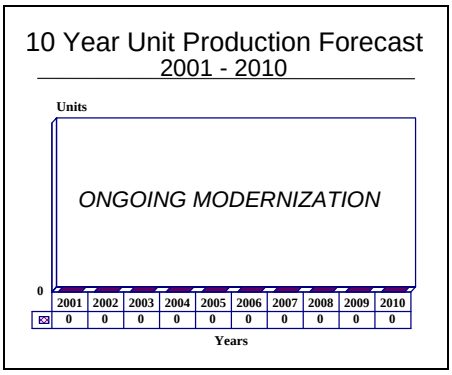
Lockheed L-1011 TriStar – Archived 08/2002

Outlook

- Lockheed converting 13 L-1011s to cargo configuration, but no buyer announced
- Outlook for further L-1011 upgrades seen dimming



Orientation

Description. Three-engine widebody commercial transport.

Sponsor. Lockheed Corp, Lockheed Aeronautical Systems Co, Burbank, CA, USA.

Contractors. Lockheed Corp, Lockheed Aeronautical Systems Co, Burbank, CA, and Marietta, GA, USA.

Status. Production ended in 1983.

Total Produced. TriStar production was as follows:

L-1011-1/100	157[(a)]
L-1011-200	44
L-1011-500	50
Total	251

[(a)]Includes one prototype/company testbed aircraft.

Application. Medium/long-range transport seating 230-400 passengers depending on variant and configuration.

Price Range. On the used aircraft market: L-1011-200, $7 million; L-1011-500, $8-$10 million.

Technical Data

(L-1011-500)

Design Features. Cantilever low-wing monoplane with 35 degree sweep at quarter chord. Inboard high-speed, outboard low-speed ailerons. Double-slotted Fowler trailing-edge flaps. Four leading-edge slats outboard of engine pylon. Three leading-edge slats inboard of each wing. Six spoilers on the upper surface of each wing. Semi-monocoque fuselage with constant cross-sectional diameter of 5.97 meters (19.7 feet) in cabin area. Cantilever tail structure with variable incidence horizontal tailplane elevator assembly and vertical fin and rudder. Landing gear is Menasco tricycle type, with twin-wheel units in tandem on each main gear, twin-wheel steerable nose gear.

	Metric	US
Dimensions		
Length overall	50.05 m	164.16 ft
Height overall	16.87 m	55.33 ft
Wingspan	50.09 m	164.30 ft
Wing area, gross	329.0 sq m	3,541.0 sq ft
Cabin length	41.4 m	135.9 ft
Cabin width	5.8 m	18.9 ft
Cabin height	2.4 m	7.9 ft
Cabin volume	453 cu m	16,000 cu ft
Weight		
Operating weight empty	111,313 kg	245,400 lb
Max payload	42,003 kg	92,600 lb
Max T-O weight	231,334 kg	510,000 lb
Performance		
Never exceed speed[(a)]	Mach 0.95 CAS	
Max cruising speed[(b)]	973 km/hr	525 kt
Service ceiling[(a)]	13,110 m	43,000 ft
Range[(c)]	9,905 km	5,345 nm

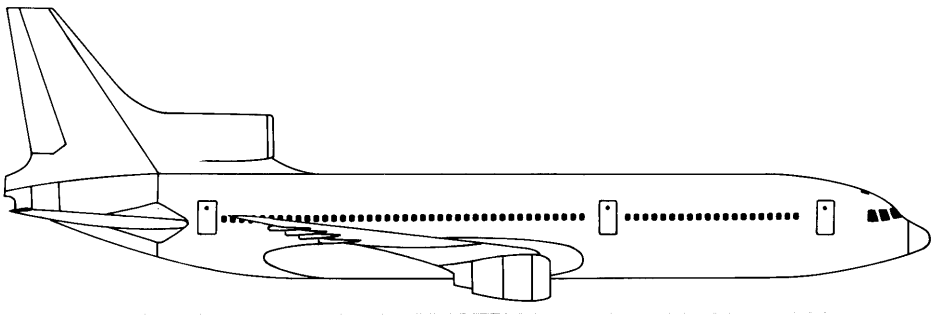
Propulsion

L-1011-1/-100	(3)	Rolls-Royce RB.211-22B turbofans rated 186.8 kN (42,000 lbst).
L-1011-200	(3)	RR RB.211-524B turbofans rated 222.4 kN (50,000 lbst).
L-1011-500	(3)	RR RB.211-524B4 turbofans rated 222.4 kN (50,000 lbst).

Seating

Two hundred forty-six mixed class on l-1011-500; 256 mixed class on all others.

[(a)]At max T-O weight.
[(b)]Mid-cruise weight at 9,146 m (30,000 ft).
[(c)]With max passengers and baggage, international reserves (max T-O weight).



LOCKHEED L-1011-500

Source: Forecast International

Variants/Upgrades

L-1011-1. Initial production version, with a gross take-off weight of 195,048 kg (430,000 lb), and a range (with maximum passengers and baggage at international reserves) of 2,870 nm. Powered by RB211-22B engines, rated at 186.8 kN (42,000 lbst) each. Deliveries began in April 1972. One hundred sixty-one produced.

L-1011-100. Extended-range version featuring a gross take-off weight of 211,378 kg (466,000 lb) and a range (Max pax./bags and reserves) of 3,660 nm. The standard L-1011-1 could be modified to the -100 configuration by adding center section tankage. Entered service in 1975. Fourteen produced, eleven converted from 1011-1 configuration.

L-1011-200. Extended-range version offers improved hot/high performance for Middle East operators. Max take-off weight is 216,367 kg (477,000 lb), and range (at 466,000 lb take-off weight) is 3,680 nm. Powered by RB211-524 engines rated at 213.5 kN (48,000 lbst), or RB211-524B or B4 engines rated at 222.4 kN (50,000 lbst). The first -200 flew in late 1976, and the version entered service in 1977. Twenty-five produced. Six converted from 1011-1 and 1011-100 configuration.

L-1011-250. Converted and re-engined L-1011s. Extended payload/range version. Powered by RB211-524B4 improved engines rated at 222.4 kN (50,000 lbst). Other existing L-1011 conversions include the L-1011-50 and the L-1011-150.

L-1011-500. Approximately 4.12 meters (13.5 feet) shorter than the previous TriStar versions, this model seats 246 (in mixed-class configuration) and has a 9,653 km (5,345 nm) range. The dash 500 was aimed at the DC-8/707 replacement market and was originally ordered by British Airways. Also powered by the RB211-524B or B4, the dash 500 has a max T-O weight of 224,980 kg (510,000 lb). Fifty aircraft produced.

Program Review

Background. Lockheed's L-1011 trijet was designed to meet the same specifications as the McDonnell Douglas/Douglas Aircraft Co DC-10. Both companies competed for sales in the late sixties, with Douglas jumping to an early lead. Lockheed faced a number of hurdles in attempting to penetrate the transport market. The firm's turboprop Electra had not sold well, and Lockheed was unable to appeal to user loyalty. Lockheed was also promoting a new airframe design to be powered by a new engine incorporating several new technological features. Many prospective customers doubted the abilities of both Lockheed and Rolls-Royce to meet their respective development goals. In the meantime, Douglas was a well-established airframe manufacturer, whose new design used the GE CF6 power plant, more conventional (less risky) in design than the Rolls-Royce engine.

Lockheed's L-1011 program encountered a series of obstacles which placed it well behind the DC-10 in the trijet race. Both Lockheed and engine manufacturer Rolls-Royce encountered serious economic problems; in fact, Rolls-Royce declared bankruptcy in February 1971. But with assistance from the US and UK governments, and through renegotiation of contracts, the first delivery after certification was made in April 1972.

The program slowly pulled forward and gradually narrowed the gap with the DC-10. In 1974, Lockheed gave the go-ahead to development of the L-1011-100 and -200, which flew in 1976 and began deliveries in 1977. In August 1976, the company launched the L-1011-500, which first flew in October 1978 and began deliveries in May 1979. The first production TriStar with extended wingtips and active controls first flew in November 1979. By 1981, it had become the standard model.

Despite the difficulties Lockheed had in selling the L-1011 in a deflated market, it has proven itself to be a sound design for its operators. The majority of the operational TriStar fleet are still in service, although their operators and primary roles have changed.

Among the major airlines, the move is to the more economical, newer generation of transports that include Boeing's 757, 767 and new 777; the McDonnell Douglas MD-11; and the Airbus Industries A320, A330 and A340. Although the L-1011 competes favorably with some of these aircraft, the trend is toward procuring aircraft that achieve the highest commonality of systems (particularly engines) within the fleet.

Current L-1011 activity is confined to the retrofit/ modernization segment, with major projects briefly described as follows:

Cargo Conversion. Lockheed Aeronautical Systems Co and the UK firm of Marshall of Cambridge both offer a cargo conversion of the L-1011 based on a military freighter conversion Marshall developed for Britain's Royal Air Force. In 1994, American International

Airways contracted Marshall to convert eight -200s, the first of which was redelivered in 1995. In 1996 Marshall began offering conversions of the -500, incorporating a 155-inch x 115-inch cargo door and capable of 135,000-pound cargo payloads on ranges up to 3,400 nautical miles.

Lockheed Aircraft Service also offered a modification of the L-1011-100/-200 variants. In this TriStar 2000 project, the aircraft would undergo structural strengthening and would be fitted with a cargo door measuring 4.3 meters x 2.9 meters. The modified TriStar would offer ranges of 4,600 kilometers (2,500 nm) and a payload of better than 55,400 kilograms (121,880 lb).

No customers emerged for the original Lockheed proposal, but in 1999 the company revived the program using Marshall's STC. Initially 13 ex-Delta TriStars are being converted and a total of 40 of that airline's aircraft may eventually be modified. Cost is approximately $13 million per aircraft.

Lockheed has yet to announce a buyer for the 13 trijets, however, and the aircraft's acknowledged high maintenance costs may hinder the manufacturer's sales efforts. The window for this program may well have closed.

ELECTRONICS

TCAS II. Since 1994, all civil airliners with 30 or more passenger seats operating in US airspace have been operating with a Traffic Alert/Collision Avoidance System (TCAS) as mandated by the US FAA. TCAS is a family of airborne systems that operate independently of ground-based ATC systems. According to FAA officials, current TCAS II devices feature state-of-the-art Version 6.04A software which significantly reduces the false alarm rate.

Manufacturers of TCAS II systems, which cost $120,000-$145,000 each, include Rockwell Collins and Honeywell. TCAS II manufacturers will continue to refine and upgrade this equipment in the years ahead.

TCAS II has been mandated for US-registered freighters by the end of 2002, and several overseas regulatory agencies have also announced plans to require TCAS II installations. In light of the L-1011's already high maintenance and operating costs, the TCAS II decree may further accelerate the retirement of the existing TriStar cargo fleet.

GPS/FMS. In December 1994, the US FAA approved the NAVSTAR Global Positioning System (GPS) for en route operations over oceanic and remote areas with some restrictions. However, during 1997-98, concerns about over-reliance on the GPS as the sole means of navigation surfaced in the United States, with the threat of signal-jamming receiving particular attention.

In late 1998, the FAA said it would not approve GPA for sole-use navigation and it now appears the agency will extend and expand the existing Loran-C system as an economical backup to GPS, at least through 2008.

Nonetheless, we expect modest L-1011 GPS receiver retrofits even as the FAA and its overseas counterparts continue to explore alternative solutions.

Timetable

Month	Year	Major Development
Jan	1966	Early Lockheed studies begin
Early	1967	RB.211 announced
Sep	1967	Lockheed's public announcement of project
Mar	1968	Initial orders/RB.211 engine selected
Mar	1968	Production go-ahead
Jan	1969	Prototype construction begins
May	1970	Initial delivery of RB.211 to Lockheed
Sep	1970	Prototype rolled out
Nov	1970	First flight
Feb	1971	Rolls-Royce bankruptcy announced
May	1971	President requests a $250 million Lockheed loan guarantee
Jul	1971	House approves loan guarantee
Aug	1971	Senate approves loan guarantee
Sep	1971	Lockheed signs new contracts with banks, customers and government
Apr	1972	First delivery
Apr	1972	First airline service
Jun	1975	L-1011-100 certification
Jan	1977	Emergency Loan Guarantee Board approves L-1011-500 development
Apr	1977	FAA certification of L-1011-200

Month	Year	Major Development
Oct	1978	L-1011-500 first flight
Apr	1979	L-1011-500 first deliveries
Dec	1981	Lockheed announces phase-out
Aug	1983	Last L-1011 rolled out
Spring	1984	Phase-out completion

Worldwide Distribution

Civil and Government Operators. See Appendix VIII: World Airline Inventories

Military Operator. United Kingdom 4 K.Mk 1, 3K.Mk 2C, 2 KC.Mk 1

Note: All UK aircraft are converted L-1011-500s.

Forecast Rationale

Lockheed is under contract to modify 13 ex-Delta TriStars for freighter operations but to date has no customer for the aircraft. Kitty Hawk said it was parking its TriStar freighters due to rising maintenance costs, a development that does not bode well for Lockheed in its efforts to find a buyer for the ex-Delta trijets.

We anticipate very little in the way of further TriStar upgrades. Several operators are seeking to unload their aircraft while others are expected to wring the remaining life out of their aircraft prior to pulling them from service.

Conversions of widebody twins such as the 767 and A300/A310 types appear to be squeezing the TriStar cargo conversion out of the marketplace.

Ten-Year Outlook

There appears to be little opportunity for further TriStar cargo conversions and/or upgrades.

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