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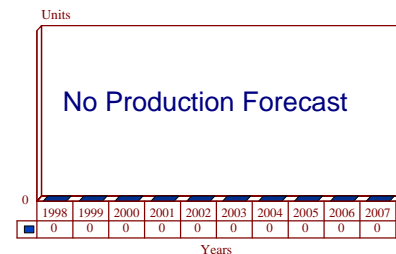
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BAe 1-11 - Archived 5/99

Outlook

- Airstar 2500 program suspended in 1997
- Romania's economic situation may preclude program re-start; no production forecast

10 Year Unit Production Forecast
1998-2007



Orientation

Description. Short-range, narrow-body, second-generation, twin-engine commercial transport aircraft.

Sponsor. The original 1-11 was sponsored privately by British Aerospace (British Aircraft Corporation). Development of the Tay-powered 1-11 was originally co-sponsored by the government of Romania, British Aerospace, Rolls-Royce, and Associated Aerospace. The Tay-1-11 program was suspended in 1991 following collapse of Associated Aerospace. The Tay-powered 1-11-2500 program launched in 1993.

Contractors. Original contractor was British Aerospace plc, Weybridge Division, Weybridge, Surrey, UK.

Licensee. ROMAERO SA, formerly IAv Bucuresti (Intreprinderea de by Avioane Bucuresti), Bucharest, Romania.

Status. Unofficial launch of 1-11-2500 in February 1993. Program subsequently suspended until further notice.

Total Produced/Active Inventory. Through the end of 1985, BAe produced 233 1-11s of all series. (See Program Review). ROMAERO (IAv Bucuresti) assembled nine -475/-500 aircraft through 1994.

Application. Short-range scheduled passenger transportation; executive aircraft.

Price Range. ROMAERO 1-11-2500 (Tay), estimated at \$22 million in 1996 US dollars.

Technical Data

Design Features. Cantilever low wing monoplane with swept wings (20 degrees at quarter chord) and conventional circular section fuselage. One turbofan

engine mounted on each side of rear fuselage. Cantilever, variable incidence T-tail. Retractable tricycle type landing gear with twin wheels on each unit.

	<u>Metric</u>	<u>US</u>
Dimensions (-475/-500/-560)		
Length overall	28.50/32.61 m	93.5/107.0 ft
Height overall	7.47 m	24.5 ft
Wingspan	28.50 m	93.6 ft

Cabin internal width	3.15 m	10.333 ft
	<u>Metric</u>	<u>US</u>
Weights		
Operating weight, empty	23,288/24,387/25,268 kg	51,339/53,762/55,704 lb
Max take-off weight	44,678/47,400 kg	98,500/104,500 lb
Max payload, typical	10,733/12,355/11,474 kg	23,661/27,238/25,296 lb
Capacities		
Standard fuel (-500)	14,024 liters	3,705 gal US
Max fuel (-500)	17,206 liters	4,546 gal US
Standard fuel (-560)	14,129 liters	3,732 gal US
Max fuel (-560)	19,920 liters	5,262 gal US
Freight hold, fwd	10.02 cu m	354 cu ft
Freight hold, rear	4.42 cu m	156 cu ft
Performance		
Take-off run (sea level, ISA)	1,676/1,981 m	5,500/6,500 ft
Still-air range ^(a)	3,013/2,726/2,459 km	1,627/1,472/1,327 nm
Cruise speed (All)	871 kmh	470 knots

^(a)Max fuel, ISA, with reserves for 370 km (200 nm) diversion and 45 min hold. Series 479/495 executive aircraft with additional 5,602 liters (1,480 gallons US) and 10 passengers: 5,325 km (2,875 nm).

Seating

Series 475, 89 passengers. Typical layout is 16 first class (four-abreast) and 49 tourist (five-abreast) seats.

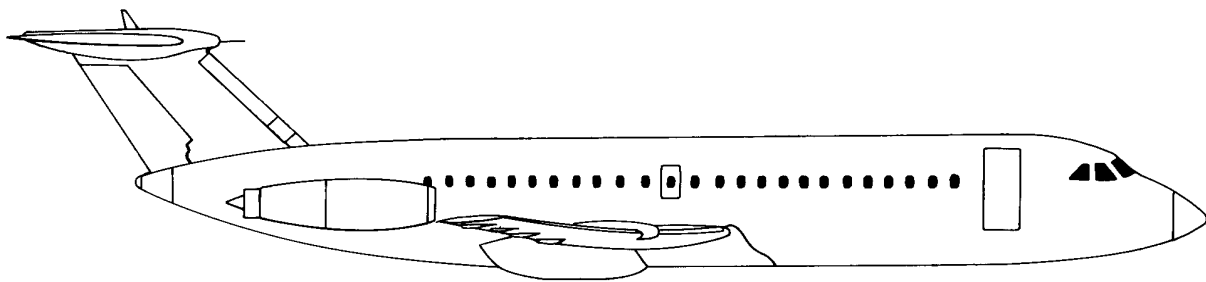
Series 500, 119 passengers.

Series 560, 109 passengers.

ROMAERO 1-11-2500, 90-104 two-class passengers; 114 all tourist.

Propulsion

BAe 1-11	(2)	Rolls-Royce plc, Derby Engine Division Spey Mk 512-14W twin-spool, low bypass-ratio turbofans rated 55.82 kN (12,550 lbst) each.
ROMAERO 1-11-2500	(2)	Rolls-Royce Tay 650-14 turbofans rated 67.2 kN (15,100 lbst each).



BAe 1-11

Source: Forecast International

Variants/Upgrades

Series 200. Initial production model, entered service with BUA and Braniff in 1965. Since introduction, the aircraft has grown in maximum take-off weight from 73,000 lbs to 78,500 lbs with an increase in payload from 13,680 lbs to

17,595 lbs. The aircraft accommodates up to 89 passengers in a high-density configuration.

Series 300. In 1966 BAe introduced this variant, externally similar to the 200, but with maximum take-off weight increased to 82,000 lbs, and increased fuel capacity for increased range. Structural modifications and enlarged capacity wheel brakes allow for increased weight. This variant also grew in weight, from the initial 82,000 lbs to 87,000 lbs. Payload increased from the introductory 15,800 lbs to 22,278 lbs.

Series 400. This model is similar to the 300 in most respects, but has lift dumpers and drop-out oxygen systems for sales in the US market. Initial MTOW was 82,000 lbs with subsequent increases to 87,000 lbs.

Series 475. Combines the standard fuselage of the Series 400 with an increased span wing. It has improved systems built to the standard of the 500 series and low-pressure tires for operation from secondary fields. Initial maximum take-off weight was 92,000 lbs with increases to 98,500 lbs. Certification and first deliveries of the 475 occurred in 1971.

Series 500. Production began in 1968, and represented the first major effort to increase the passenger and freight capacity of the aircraft. The fuselage was lengthened by 2.539 m (8.333 ft) through the insertion of plugs forward and aft of the wing, and the wing was modified with extensions which increase its span by 1.524 m (5 ft). The Series 500 has a maximum take-off weight of 47,401 kg (104,500 lb), increased payload of 12,228 kg (27,089 lb), and passenger capacity of 97-119. This larger and heavier airplane is made possible by the use of uprated Spey 512DW turbofans.

Freight/Convertible Versions. BAe sold various passenger/freighter variants of the Series 400/475/500 aircraft. Typical 400/475 layouts provide 54 seats and

room for six standard A.T.A. containers. In the pure freighter role the Series 500 holds 19.45 cu m (687 cu ft) of volume. Convertible/freighter models are provided with a 3.05 x 1.85 m (10.0 x 6.083 ft) forward freight loading door, reinforced floors, and a stowable freight handling system. The first of these was delivered to the Sultan of Oman in late 1975. AJ Walter, a UK firm specializing in service and support of 1-11 transports, is designing a freighter modification in combination with Stage III/Chapter 3 hush-kits.

ROMAERO 1-11-2500. Upgraded, re-engined version of the Series 500 formerly designated 1-11-2000 by IAv Bucuresti, now called ROMAERO SA. It is designed to incorporate twin Rolls-Royce Tay 650s in Dee Howard-designed and produced nacelles with Dee Howard thrust reversers, and an upgraded cockpit including a new autopilot and EFIS. First aircraft was due off the Bucuresti line in late 1991, and was to be flown to the UK where Lovaux would complete the interior and avionics installation. Aircraft were to be configured for 90-104 seats with 115 all-tourist passengers. Design specification included a 15-17 percent better fuel consumption and 20 percent more power than its predecessor, and has a full-passenger range of 2,000 nautical miles. The program was suspended in 1991 when UK leaser Associated Aerospace went into receivership. It was relaunched as the 1-11-2500 in February 1993 on an order for 11 by Kiwi International, a US-based startup airline. Kiwi was also to act as North American marketing representative for ROMAERO.

Dee Howard BAC 2400. Tay re-engined version of the Dash 400, 475, and 500, this program was suspended in 1990. Performance is similar, if not identical, to the ROMBAC 1-11-2000.

Program Review

Background. 1-11 development actually began in 1956 as Hunting Aircraft unveiled plans for a 32-48 seat light jet designated H.107. Hunting was absorbed in 1960 by the newly formed British Aircraft Corporation. BAC modified the H.107 design to incorporate the Spey turbofan, the engine also selected to power the Trident.

Development of the BAe 1-11 actually took place in parallel with that of the McDonnell Douglas DC-9. The production go-ahead was announced in 1961 with an order for 10 aircraft from British United Airways, and CAA and FAA certifications were issued in April 1965. The BAe 1-11 has since been produced in five major variants and has been sold to approximately three dozen

carriers, plus some corporations. Available retrofit features include long-range fuel systems for the current series 475 and 500, a gravel runway kit, and a Stage II/Chapter 2 "hush kit" for the Spey engines. Stage III/Chapter 3 re-engining and hush-kit programs remain in development phases.

Licensed Romanian Program. In May 1979, BAe concluded an agreement with Centrul National Al Industrie Aeronautice Romane (CNIAR), as ROMAERO was then known, for the BAe 1-11 Series 475 and 500 aircraft to be license-built in Romania to meet Romanian internal requirements, and for export. To initiate the transfer process, a Series 487 freighter and two Series 525/1s were delivered as complete aircraft by BAe in late

1981-early 1982. The industrial transfer to the Romanian aircraft industry was undertaken in steps as a means of reducing the scale of UK-supplied kits of parts for an initial batch of 22 aircraft. In the first of the stages, delivery was completed in April 1981 of three sets of wings, fuselages, and other major UK-built components, and the first flight of a Romanian-assembled Series 560 aircraft was made in September 1982. That aircraft was handed over to TAROM (Transporturile Aeriene Romane), the Romanian state airline, in late December 1982, and entered service in January 1983. At the end of 1988, CNIAR had delivered seven aircraft. Two more have since been delivered.

The Romanian versions included the Series 495, which combines the standard fuselage and accommodations of the UK-built Series 400 with wings and the power plant of the Series 560 and a modified landing gear system, using low-pressure tires; and the Series 560, derived from the UK Series 300/400. The Series 560 has a lengthened fuselage, an increased wing span, strengthened landing gears, and heavier wing planks; it can accommodate up to 109 passengers.

1-11/Tay. In March 1990, British Aerospace said it was close to reaching an agreement with the newly elected Romanian government for licensed production of the 1-11-500 series aircraft. A revised avionics package and Rolls-Royce Tay 650 engines would be added to

Romanian-built 1-11s. Late in 1990, a new UK leasing company, Associated Aerospace Ltd, signed a \$1 billion contract for the production of 50 new Tay-powered 1-11s with first delivery scheduled for December 1991. However, Associated subsequently became insolvent and this deal fell through.

Noise Retrofits. The Dee Howard Company, of San Antonio, TX, launched a project to re-engine 1-11s with Rolls-Royce Tays. Dee Howard officials said in 1991 that retrofits would take 90 days and cost about \$8 million. Aircraft would fully meet Stage 3/Chapter III noise limits. In addition to the engine change, Dee Howard would also strengthen the 1-11s' structures, re-engineer the fuselage frames, fix new crane beams to hold the engines, and supply new pylons and nacelles. A new bleed-air system, long-range fuel tanks, and new electrical, power, and fuel systems were also included. Dee Howard has since dropped this program.

Enter Kiwi. In 1993 Kiwi International, a start-up airline operating out of Newark, NJ, placed orders for 11 Tay-powered 1-11s, and took out options on five more. By September of that year ROMAERO had completed the first fuselage assembly and had three others in partial stages of construction. Kiwi has subsequently undergone some changes in management, but an airline spokesperson has confirmed the carrier's commitment to the 1-11-2500. Program suspended until further notice.

Funding

The Dee Howard Tay 1-11 development cost was estimated at approximately \$75 million in 1991 US dollars. ROMAERO is expected to invest an estimated \$50 million to \$60 million to complete engineering and certification of the 1-11-2500, and received a \$65 million loan from the United Bank of Kuwait toward the end of 1994.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1961	Production go-ahead announced
Aug	1963	Prototype first flight
Dec	1963	Production aircraft first flight
Early	1965	US and UK certification obtained
Apr	1965	Airline service begun
Jun	1967	Series 500 prototype first flight
Aug	1968	Series 500 production deliveries begun
Aug	1970	Series 475 prototype first flight
Jul	1971	Series 475 production deliveries begun
	1978	Licensed agreement with Romania initialed
	1981-85	Three complete aircraft and 22 in kit form to be delivered to Romania
Sep	1982	First Romanian-assembled 1-11 flew
	1986	Romania began licensed production
Feb	1993	Kiwi and ROMAERO re-launch Tay/1-11
	1997	ROMAERO 1-11-2500 program suspended

Worldwide Distribution

See Airline Inventories section.

Forecast Rationale

The planned 1-11-2500 program has been suspended and, given Romania's present economic woes, we do not anticipate activity to resume. Accordingly, we are not forecasting production of the 1-11-2500.

Ten-Year Outlook

No production forecast.

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