intermittent discussions continued into 2002 before being abandoned. In January 2003, Alenia declined to take up offered 5 per cent stake in Airbus, but instead signed wideranging collaborative agreement with Boeing, with specific areas to be decided by committee formed in 2003.

Aeronautics Division dedicated to full range of activities, from design and production to modification and product support for both military and civil aircraft; most entail collaboration with other aerospace companies; in 2001, division had 9,415 employees and conducted 48 per cent of

its activities in the military sphere.

Division's activities fall into categories of Military Aircraft, Regional Aircraft and Aerostructures. It also operates Officine Aeronavali Venezia, specialising in maintenance, overhaul and modification of commercial and military aircraft.

In military sector, company designs and produces directly, or through international collaborations, combat and transport aircraft such as Tornado, Eurofighter Typhoon, C-27J, A400M and ATR 42 MP Surveyor; was also responsible for updating of the F-104S/ASA-M and TF-104G-M in service with Aeronautica Militare Italiana and has assembled AV-8B

Harrier II Plus for the Italian Marina Militare.
In regional aircraft sector, activities include production of the ATR turboprop family developed with Aerospatiale Matra.

In the aerostructures sector, Alenia co-operates with other major aeronautical companies manufacturing structural parts for commercial aircraft such as B767, B777, B717, A321, A300/310, A330/A340, Falcon 900EX and Falcon 2000. Is 4 per cent risk-sharing partner in Airbus A380 programme, responsible for a fuselage section.

In the modification and maintenance field, Alenia Aerospazio has a full capability of design, production, installation and tests of complex parts and systems.

UPDATED

# ALENIA/LOCKHEED MARTIN C-27J SPARTAN

TYPE: Twin-turboprop transpor

PROGRAMME: Conceived in 1960s as jet-powered, V/STOL ransport to NATO requirement (NBMR-4), but this version not developed. Original Fiat G222 designed by Giuseppe Gabrielli; two prototypes (lacking the pressurisation standard on later aircraft) flew on 18 July 1970 (MM582) and 22 July 1971 (MM583), both at Turin; MM582 handed over to Italian Air Force for operational evaluation on 21 December 1971. First production G222 (MM62101) flew 23 December 1975; deliveries began 21 November 1976 with single aircraft to Dubai, and to Italy on 21 April 1978. Tenth production aircraft was first to be built at Naples; 27th (March 1979) was 22nd and last built at Turin. Main users in Italy are 2° and 98° Gruppi of the 46° Brigata Aerea at Pisa. Civil category R (equivalent to FAR Pt 25) certification granted to G222SAA by Italian airworthiness authority on 1 April 1997. subvariants for specific roles

Improved version of G222 conceived during 1995 negotiations between Lockheed Martin and Alenia on potential offsets for proposed Italian purchase of C-130J Hercules; initially designated G222J, by reason of having C-130J flight deck features and improved (T64G) versions

of the G222's engines with new four-blade propellers. Formally announced as a joint project in February 1996, when commonality with the C-130J was further increased by adoption of the Allison (now Rolls-Royce) AE 2100 as power plant, allied to six-blade propellers. Accordingly redesignated C-27J, to reflect the C-27A version of G222 delivered to the US Air Force. Feasibility phase February to September 1996; definition phase September 1996 to

Development and certification costs being shared equally between Alenia Aerospazio and Lockheed Martin; latter responsible for propulsion systems, avionics, worldwide marketing and product support; Alenia for production, flight test and certification; promotion by Lockheed Martin Alenia Tactical Transport Systems. By 2003, Lockheed Martin reportedly seeking reduced participation through voluntary relegation to through subcontractor.

Programme formally launched on 17 June 1997; 'propulsion test' prototype, a converted G222 demonstrator, rolled out at Turin/Caselle on 14 June 1999 and first flew (c/n 4043; I-CERX) 24 September 1999; initial testing completed second quarter of 2000; modified for certification trials and resumed flying on propulsion system, performance and handling evaluation.

Second C-27J and initial new-build aircraft, 4115/I-FBAX, first flew 12 May 2000; first with advanced flight deck and full avionics, new APU and new landing gear; achieved 54 hours/23 sorties in initial two months; available for sale after completion of civil certification available for sale after completion of civil certification trials. Third prototype, 4033/MMCSX62127, converted from Italian Air Force G222TCM, first flew 8 September 2000 returned to IAF after DGAA civil certification, which achieved on 20 June 2001. Military type certificate awarded 20 December 2001, following 445 sortie, 793 hour programme. First two batches, totalling 10, under construction (long lead items) by 1999. Final assembly remains in Italy only

CURRENT VERSIONS: **Transport**: As described. **AEW**: Airborne early warning version proposed in 1998, employing Ericsson Erieye system, as fitted to Saab S 100B Argus.

**Firefighter:** Proposed with 2,200 kg (4,850 lb) mission system and 6,800 kg (14,991 lb) of retardant liquid.

Aerial Sprayer: Proposed with 2,200 kg (4,850 lb) mission system; capable of covering 50 hectares (124 acres) at 150 litres/hectare (16.0 US gallons; 13.0 Imp gallons/acre).

CUSTOMERS: See table. Italian Air Force announced proposed launch order for 12 on 11 November 1999, although this

#### G222 and C-27 CUSTOMERS

Customer	Version	Qty	First aircraft	Delivered
Argentine Army	G222	3	AE260	29 Mar 1977
Congo Air Force	G222	3		on order <sup>4</sup>
Dubai Air Force	G222	1	321	21 Nov 1976
Greek Air Force	C-27J	128		2004
Italy: prototypes	G222	2	MM582	21 Dec 1971
Air Force	G222TCM	$40^{3}$	MM62101	Apr 1978
	C-27J	57		2005
Air Force	G222RM	4	MM62139	Jan 1983
Air Force	G222VS	2	MM62107	1978
SNPC	G222PROCIV	56	MM62145	1987
Libyan Air Force	G222T	20	221	1981
Nigerian Air Force	G222	5	950	Sep 1984
Somali Air Force	G222	2	AM-94	1980
Venezuelan: Army	G222	11	EV-8327	1983
Air Force	G222	6	1258	1984
Thai Air Force	G222	6	60307	2 May 1995
US Air Force	C-27A	105	90-0170	17 Apr 1991
Alenia (demonstrator)	G222/C-27J	1	I-CERX	1983
	C-27J	1	I-FBAX	2000
Total		129²	* * * * * * * * * * * * * * * * * * * *	

Transferred to air force

Prototypes and 22 early aircraft built at Turin; remainder at Naples

<sup>3</sup> Including 10 with provision for rapid conversion to 222SAA; two to Tunisian Air Force 19 May 2001; C-27J purchase involves Alenia buy-back of 39 G222s for possible resale

Built, but awaiting completion of contractual details

Transferred to US government, with civil registrations, 1999

All reverted to transports in 2001

Plus seven options Plus three options



Third C-27J Spartan, converted from G222 MM62127 (Paul Jackson)

NEW/0546923



C-27J's five-screen EFIS

not signed until 27 June 2002 and for initial quantity of five; deliveries planned to begin in mid-2005 and be completed in late 2006. Greek Air Force selected C-27J on 1 March 2002, proposing 12 plus three options, and signed contract for 12 on 17 January 2003; deliveries to begin in mid-2004 and end 12 months later. Up to 500 sales anticipated over a 20 year period, mostly to existing Hercules operators. Lockheed Martin co-markets the aircraft. Sales targets include Argentina, Brazil (12) and Taiwan (18 to 22); also promoted for US Army's 40-aircraft Aerial Common Sensor programme and to US Army National Guard (44) as replacement for Shorts

Sherpas.
costs: €24.75 million (Greek programme unit cost, 2003). esign Features: Conventional tactical transport configuration of high wing, pannier-mounted main landing gear and upswept rear fuselage with integral loading ramp.

Intended to complement the Lockheed Martin Hercules.
Upgraded G222 with new, two-crew flight deck and increased performance. Propulsion system, cargo loading system and many of the avionics and flight controls are adapted from the C-130J Hercules. Compared with the G222, the C-27J is intended to provide increases of 35 per cent in range, 30 per cent cruise ceiling, 15 per cent highspeed cruise and over 200 per cent payload/range/speed; maintainability and reliability are scheduled to increase by 100 per cent for the engine, 275 per cent for propeller, 150 per cent for other systems and 30 per cent for avionics, resulting in a saving of 30 per cent in operating costs (including 5 per cent off fuel).

has max thickness/chord ratio of 15 per cent.

Dihedral 2° 30′ on outer panels.

FLYING CONTROLS: Conventional; manually actuated ailerons and elevators; powered rudder. Ailerons each have inset servo tab. Two-section hydraulically actuated spoilers ahead of each outboard flap segment, used also as lift dumpers on landing. Double-slotted flaps extend over 60 per cent of trailing-edge. Spoilers and flaps fully powered by tandem hydraulic actuators. Rudder fully powered by tandem hydraulic actuators. Two tabs in each elevator; no rudder tabs

STRUCTURE: Wing of aluminium alloy three-spar fail-safe box structure, built in three portions. One-piece constant chord centre-section fits into recess in top of fuselage and is secured by bolts at six main points. Outer panels tapered on leading- and trailing-edges. Upper surface skins are of 7075-T6 alloy, lower surface skins of 2024-T3 alloy. All control surfaces have bonded metal skins with metal honeycomb core

Pressurised fail-safe fuselage of aluminium alloy stressed skin construction and circular cross-section. Easily removable stiffened floor panels. Cantilever safelife tail surfaces of aluminium alloy, with sweptback threespar fin and slightly swept two-spar variable incidence tailplane.

Subcontractors include Aermacchi (outer Piaggio (wing centre-section), Agusta (tail unit), Magnaghi (landing gear) and Aeronavali Venezia (airframe components)

Hydraulically retractable tricycle type, LANDING GEAR: suitable for use from prepared runways, semi-prepared strips or grass fields. Main gear built by APPH; nose gear by Magnaghi. Steerable twin-wheel nose unit retracts forward. Main units, each consisting of two single wheels in tandem, retract into fairings on sides of fuselage. Oleopneumatic shock-absorbers. Gear can be lowered by gravity in emergency, the nose unit being aided by aerodynamic action and the main units by the shock-absorbers, which remain compressed in the retracted position. Oleo pressure in shock-absorbers is adjustable to permit variation in height and attitude of cabin floor from ground. Low-pressure tubeless tyres on all units, size 39×13 (14/16 plv) on mainwheels, 29×11.00-12 or 29×11.00-10 (10 ply) on nosewheels. Tyre pressures 4.41 bar (64 lb/sq in) on main units, 3.92 bar (57 lb/sq in) on nose unit. Hydraulic multidisc brakes. POWER PLANT: Two Rolls-Royce AE 2100D2 turboprops, each rated at 3,460 kW (4,640 shp), driving Dowty R391 six-blade composites propellers. Fuel in integral tanks; two in outer wings, combined capacity 6,800 litres (1,796 US gallons; 1,495 Imp gallons); two centre-section tanks, combined capacity 5,200 litres (1,374 US gallons; 1,143 Imp gallons); crossfeed provision to either engine. Total overall fuel capacity 12,000 litres (3,170 US gallons; 2,638 Imp gallons).

ACCOMMODATION: Two-pilot crew on flight deck with third seat; provision for loadmaster or jumpmaster when required. Crew door, port, forward; Type III emergency door, starboard, forward; paratroop door each side, immediately rear of sponsons; rear loading ramp; emergency hatches (three) in roof, above flight deck and

Standard troop transport version has 34 foldaway sidewall seats and 12 stowable seats for 46 fully equipped troops (62 in high density). Paratroop transport can carry between 34 (normal) and 46 (maximum) fully equipped paratroops, and is fitted with 32 sidewall seats, plus eight stowable seats, door jump platforms and static lines. Cargo transport version can accept standard pallets of up to 2.24 m (88 in) wide, and can carry up to 9,000 kg (19,841 lb) of freight. Hydraulically operated rear-loading ramp and upward-opening door in underside of upswept rear fuselage, which can be opened in flight for airdrop operations. Five pallets of up to 1,000 kg (2,205 lb) each can be airdropped from rear opening, or single pallet of up to 5,000 kg (11,023 lb). Paratroop jumps can be made either from this opening or from rear side doors. Medical evacuation accommodation for 36 stretchers and six attendants. Entire accommodation pressurised.

SYSTEMS: Pressurisation system maintains a cabin differential of 0.41 bar (5.97 lb/sq in), giving a 1,200 m (3,940 ft) environment at altitudes up to 6,000 m (19,680 ft). Air conditioning system uses engine bleed air during flight; on ground, it is fed by compressor bleed air from APU to provide cabin heating to a minimum of 18°C. Honeywell 113 kW (152 hp) APU, installed in starboard main landing gear fairing, provides power for engine starting, hydraulic pump and alternator actuation, air conditioning on ground, and all hydraulic and electrical systems necessary for loading and unloading on ground.

Two independent hydraulic systems, each of 207 bar (3,000 lb/sq in) pressure. No. 1 system actuates flaps, spoilers, rudder, wheel brakes and (in emergency only) landing gear extension; No. 2 system actuates flaps, spoilers, rudder, wheel brakes, nosewheel steering, landing gear extension and retraction, rear ramp/door and windscreen wipers. Auxiliary hydraulic system, fed by APU-powered pump, can take over from No. 2 system in

flight, if both main systems fail, to operate essential services. In addition, a standby hand pump is provided for emergency use to lower the landing gear and, on the

ground, to operate the ramp/door and parking brakes.

Three 45 kVA alternators, one driven by each eng through constant-speed drive units and one by the APU, provide 115/200 V three-phase AC electrical power at 400 Hz. 28 V DC power is supplied from the main AC busses via two transformer-rectifiers, with 24 V 34 Ah Ni/Cd battery and static inverter for standby and emergency power. External AC power socket. Engine intakes anti-iced by electrical/hot air system. Pneumatically inflated de-icing boots on outer wing leading-edges, and fin and tailplane leading-edges, using engine bleed air. Liquid oxygen system for crew and passengers (with cabin wall outlets); this system can be replaced by a gaseous oxygen system if required. Emergency oxygen system available occupants in the event of a pressurisation failure.

VIONICS: Radar: Northrop Grumman AN/APN-241.

Instrumentation: Five-screen EFIS based on C-130J flight deck. Radar integrated with moving map display. NVG-compatible.

IMENSIONS, EXTERNAL.	
Wing span	28.70 m (94 ft 2 in)
Wing aspect ratio	10.0
Length overall	22.70 m (74 ft 51/2 in)
Height overall: unladen	10.57 m (34 ft 81/4 in)
fully laden	9.70 m (31 ft 10 in)
Fuselage: Max diameter	3.55 m (11 ft 73/4 in)
Tailplane span	12.40 m (40 ft 81/4 in)
Wheel track	3.67 m (12 ft 0½ in)
Wheelbase (to c/l of main units):	
unladen	6.23 m (20 ft 51/4 in)
fully laden	6.40 m (21 ft 0 in)
Propeller diameter	4.11 m (13 ft 6 in)
D' 1	0 50 (21 6 2 :-)

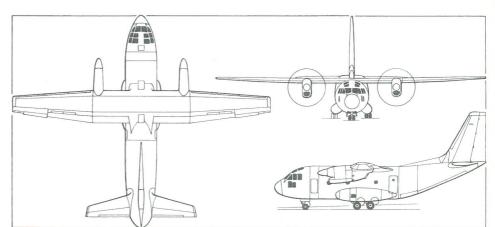
Distance between propeller centres 9.50 m (31 ft 2 in) Propeller/fuselage clearance 1.04 m (3 ft 5 in) Rear-loading ramp/door: Width 2.45 m (8 ft 01/2 in) .25 m (7 ft 4½ in) Height 0.70 m (2 ft 3½ in) 1.52 m (4 ft 11¾ in) Crew door: Width Height Emergency door: Width 0.53 m (1 ft 83/4 in) Height 1.01 m (3 ft 3¾ in) Paratroop doors: Width 0.91 m (2 ft 11¾ in) Height 1.92 m (6 ft 31/2 in) Emergency hatch:

0.70 m (2 ft 3½ in) Flight deck: Width 0.50 m (1 ft 7¾ in) Length Cabin (both): Width 0.63 m (2 ft 0¾ in) Length 0.90 m (2 ft 111/2 in) SIONS, INTERNAL:

8.58 m (28 ft 13/4 in) Main cabin: Length Width 2.45 m (8 ft 01/2 in) 2.25 m (7 ft 4½ in) 21.0 m² (226 sq ft) Height Floor area: excl ramp incl ramp 25.7 m<sup>2</sup> (276 sq ft) 58.0 m<sup>3</sup> (2,048 cu ft) Volume

82.00 m2 (882.6 sq ft) Wings, gross 3.65 m² (39.29 sq ft) 18.40 m² (198.06 sq ft) Ailerons (total) Trailing-edge flaps (total) Spoilers (total) 1.65 m<sup>2</sup> (17.76 sq ft) 12.19 m<sup>2</sup> (131.21 sq ft) 7.02 m<sup>2</sup> (75.56 sq ft) Fin (incl dorsal fin) Rudder Tailplane 19.09 m<sup>2</sup> (205.48 sq ft) Elevators (total) 4.61 m2 (49.62 sq ft)

EIGHTS AND LOADINGS: Operating weight empty Max payload: at 2.5 *g* at 2.25 *g* 17,000 kg (37,479 lb) 9,000 kg (19,840 lb) 10,225 kg (22,542 lb) 5,000 kg (11,023 lb) airdrop Max fuel load Max T-O weight 9,400 kg (20,725 lb) 31,800 kg (70,106 lb) Max landing weight 30,000 kg (66,138 lb) 1,500 kg/m² (307.2 lb/sq ft) 387.8 kg/m² (79.43 lb/sq ft) Max cargo floor loading Max wing loading Max power loading 4.60 kg/kW (7.55 lb/shp)



Alenia/Lockheed Martin C-27J Spartan, showing 'kneeling' position of landing gear (James Goulding)

PERFORMANCE Max level speed Time to 4,570 m (15,000 ft) 325 kt (602 km/h; 374 mph) 8.380 m (27.500 ft) Initial cruising altitude 9,145 m (30,000 ft) Service ceiling 3,355 m (11,000 ft) 410 m (1,345 ft) Service ceiling, OEI T-O run T-O to 15 m (50 ft) 640 m (2,100 ft)

Landing from 15 m (50 ft) 690 m (2,265 ft) Landing run Radius of action: 390 m (1.280 ft) with 46 paratroops 1,100 n miles (2,037 km; 1,265 miles) with 5,000 kg (11,023 lb) airdrop load 1,215 n miles (2,250 km; 1,398 miles) Range: with max payload

ferry

g limit

1.160 n miles (2.148 km; 1.334 miles) with 6,000 kg (13,228 lb) payload

2,500 n miles (4,630 km; 2,877 miles) 3,200 n miles (5,926 km; 3,682 miles)

UPDATED

# ALPI

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The Alpi Pioneer 300S is a derivation of the Asso V, designed by Vidor Guiseppe and formerly marketed by Rusalen & Rusalen. German marketing is by Flugtechnik at Damme. Alpi also produces the wooden Pioneer 200 and has a  $5,000~\rm{m}^2$  ( $53,820~\rm{sq}$  ft) factory at Pordenone; wooden components are sourced from Croatia.

UPDATED

#### **ALPI PIONEER 200**

TYPE: Side-by-side ultralight kitbuilt.

PROGRAMME: Draws on experience gained from Pioneer 300. CUSTOMERS: At least 23 produced by early 2003. Exports include New Zealand and USA.

DESIGN FEATURES: Similar to Pioneer 300, but with untapered wing and fixed landing gear. Quoted build time 1,000 hours.

FLYING CONTROLS: As Pioneer 300, but without flaps. STRUCTURE: Broadly as Pioneer 300, but with less swept fin. LANDING GEAR: Fixed, tricycle layout; otherwise as Pioneer 300

POWER PLANT: One 59.6 kW (79.9 hp) Rotax 912 UL flat-four driving two-blade fixed-pitch propeller or optionally 59.7 kW (80 hp) Jabiru 2200 and two- or three-black variable pitch propellers. Fuel capacity 54 litres (14.3 US gallons; 11.9 Imp gallons), of which 50 litres (13.2 US gallons; 11.0 Imp gallons) are usable, in single centrally positioned fuel tank.

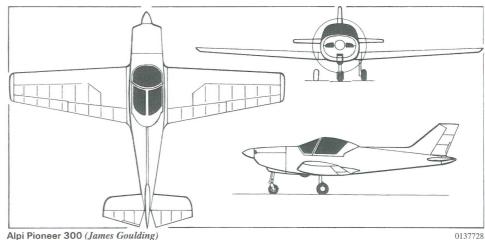
DIMENSIONS, EXTERNAL:

Max operating speed

Wing span Length overall 7.30 m (23 ft 11½ in) 6.20 m (20 ft 4 in) DIMENSIONS, INTERNAL: 1.05 m (3 ft 51/4 in) Cockpit max width 10.22 m<sup>2</sup> (110.0 sq ft) Wings, gross WEIGHTS AND LOADINGS: 275 kg (606 lb)

Weight empty Max T-O weight 450 kg (992 lb) PERFORMANCE: 129 kt (240 km/h; 149 mph) Never-exceed speed (VNE)

111 kt (205 km/h; 127 mph)



Alpi Pioneer 300 (James Goulding)

Normal cruising speed at 75% power

100 kt (185 km/h; 115 mph) 34 kt (62 km/h; 39 mph) 305 m (1,000 ft)/min Stalling speed, flaps down Max rate of climb at S/L T-O and landing run 100 m (330 ft) 351 n miles (650 km; 403 miles) Range with max fuel UPDATED

ALPI PIONEER 300

TYPE: Side-by-side ultralight-kitbuilt.

PROGRAMME: Derivation of Aerei Asso Vs. First flight February 1999 (Italian ultralight category; Mid-West engine); public debut 2 April 1999 and exhibited at Aero '99, Friedrichshafen, later in the same month, at which time total of 11 hours flown.



Cockpit instruments of Alpi Pioneer 300 (Paul Jackson) NEW/0552265



Alpi Pioneer 300 on display at Aero '03 (Paul Jackson)

NEW/0552266

CURRENT VERSIONS: **300L**: Long-span version for European market; no longer produced by Alpi.

300S: Short-span version, predominantly for US market, as described.

CUSTOMERS: At least 72 kits sold, of which over 30 300Ls flying in France, Germany, Italy and Spain by end 2002; 300Ss to US in 2001

COSTS: Quick-build kit €28,890 (2003), excluding engine, propeller, instruments and upholstery.

DESIGN FEATURES: Streamlined, retractable gear, low-wing monoplane, adaptable for Ultralight or Experimental category operation. Tapered wings and horizontal tail surfaces; sweptback fin; upturned wingtips; NACA 2315 aerofoil. Asso Vs has biconvex asymmetric wing section. Rearward-sliding canopy; fixed windscreen. Dual controls. Baggage shelf behind seats holds 27 kg (60 lb). Maximum roll rate 120°/s. Quoted build time 700 hours for standard kit; 350 hours for fast-build kit.

FLYING CONTROLS: Conventional and manual. Actuation by steel cables. Horn-balanced rudder. Electrically actuated flaps deflect to 30°. Trim tabs on rudder and port elevator.

STRUCTURE: Wooden airframe, including wing with single box spar; preformed composites fuselage/fin covering in left and right halves; composites engine cowling and wingtips; Dacron-covered elevators and rudder; plywood-covered ailerons, flaps and tailplane.

Retractable, tricycle type; steerable LANDING GEAR: nosewheel with helical spring suspension. Mainwheels have lever/rubber-in-compression suspension.

Mainwheels retract outwards; nosewheel rearwards; electric actuation. No doors, apart from fairing fixed ahead of nosewheel leg. Ingegno wheels with disc brakes; mainwheels size 4.00-6, nosewheel 4.00-4.

POWER PLANT: One 73.5 kW (98.6 hp) Rotax 912 ULS four-stroke, driving a two-blade GT-2/173/155 fixed-pitch Jabiru 3300 and Mid-West AE110 engines. Fuel tank in each wing, combined capacity 80 litres (21.1 US gallons; 17.6 Imp gallons); 35 litre (9.2 US gallon; 7.7 Imp gallon) fuselage tank optional.

AVIONICS: To customer's choice.

DIMENSIONS, EXTERNAL:

Wing span 8.10 m (26 ft 7 in) Length overall 6.25 m (20 ft 6 in) Height overall 2.00 m (6 ft 63/4 in) DIMENSIONS INTERNAL:

Cockpit max width

Wings, gross 11.00 m<sup>2</sup> (118.4 sq ft)

WEIGHTS AND LOADINGS:

280 kg (617 lb) Weight empty Max T-O weight: ultralight 450 kg (992 lb) 520 kg (1,146 lb) experimental

PERFORMANCE (AE 110 engine):

Never-exceed speed (VNE) and max level speed

153 kt (285 km/h; 177 mph) Cruising speed at 75% power

135 kt (250 km/h; 155 mph) 33 kt (60 km/h; 38 mph) Stalling speed Max rate of climb at S/L 500 m (1,640 ft)/min T-O and landing run 150 m (492 ft) 702 n miles (1,300 km; 807 miles) Range g limits +4.4/-2.2

Jane's All the World's Aircraft 2004-2005

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1.05 m (3 ft 51/4 in)