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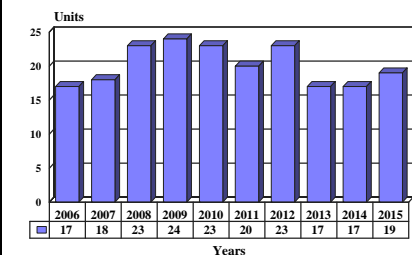
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CASA/IPTN CN-235/C-295 - Archived 8/2007

Outlook

- All future deliveries will be of military versions, primarily from EADS CASA
- New C-295 generating widespread interest; competes with Alenia C-27J for U.S. Army, other contracts
- U.S. Coast Guard ordered two CN-235s, plans about 30 more
- IAe backlog drying up but it's expected to land new orders

10 Year Unit Production Forecast
2006 - 2015



Orientation

Description. Pressurized, 30- to 44-seat, twin-turboprop regional/commuter and military utility transport aircraft. Stretched C-295 seats 60 passengers or 78 troops.

Sponsor. CN-235 originally sponsored by CASA and IPTN with support of respective governments; partnership since dissolved. C-295 a private venture of CASA.

Status. CN-235 in production at CASA and at IPTN; CN-295 in production at CASA.

Total Produced. Through 2005 an estimated 225 CN-235s were delivered, while CASA had built approximately 23 C-295s.

Application. Regional passenger transportation. Additional configurations for dedicated cargo, military personnel transport, and special-purpose missions such as maritime patrol, search and rescue.

Price Range. CN-235-200M, approximately \$18 million; C-295, approximately \$23 million – all in 2006 dollars.

Contractors

Prime

EADS CASA	http://www.eads.com , Avenida de Aragon, 404, Madrid, 28022 Spain, Tel: + 34 91 585 7000, Fax: + 34 91 585 7666, Prime
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Subcontractor

GE - Aviation	http://www.geae.com , 1000 Western Ave, Lynn, MA 01910-0001 United States, Tel: + 1 (617) 594-0100, Fax: + 1 (617) 594-4729 (CT7-9C Turboprop)
Hamilton Sundstrand	http://www.hamiltonsundstrand.com , One Hamilton Rd, Windsor Locks, CT 06096-1010 United States, Tel: + 1 (860) 654-6000, Fax: + 1 (860) 654-2621,

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	Email: hs.general@hds.utc.com (Propeller)
Kidde-Graviner Ltd	http://www.kiddegraviner.com , Mathisen Way, Poyle Rd, Colnbrook, SL3 0HB Berkshire, United Kingdom, Tel: + 44 01753 683245, Fax: + 44 01753 685126, Email: kidde.graviner@kiddegraviner.com (Fire Detection System)
Pratt & Whitney Canada	http://www.pwc.ca , 1000 Marie-Victorin Blvd, Longueuil, J4G 1A1 Quebec, Canada, Tel: + 1 (450) 677-9411, Fax: + 1 (450) 647-3620, Email: marketing@pwc.ca (PW127 Turboprop Engine)
Rockwell Collins Inc	http://www.rockwellcollins.com , 400 Collins Rd NE, Cedar Rapids, IA 52498-0001 United States, Tel: + 1 (319) 295-1000, Fax: + 1 (319) 295-5429, Email: collins@rockwellcollins.com (Flight Control System)
Ultra Electronics, Electrics Division	http://www.ueed.co.uk , Kingsditch Ln, Cheltenham, GL51 9PG Gloucestershire, United Kingdom, Tel: + 44 1242 221 166, Fax: + 44 1242 221 167, Email: andrew.thompson@ueed.co.uk (Electronic Control)
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Technical Data

(CN-235/C-295)

Design Features. High-wing design; airfoil optimized for short/medium ranges. Excellent climb performance, operates into some austere airfields. Carbon-fiber material in secondary structures such as flaps and ailerons. Airframe largely of light alloy construction. Retractable tricycle-type landing gear; main units deploy from faired pods mounted on the fuselage.

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Wingspan	25.81 m	84.682 ft
Length overall	21.353/34.05 m	70.059/111.72 ft
Height overall	18.177 m	26.829 ft
Cabin width, max	2.70 m	8.859 ft
Cabin height, max	1.90 m	6.234 ft
Cabin length(a)	9.65 m	31.662 ft
Weight (estimated)		
Operating weight, empty	9,400 kg	20,724 lb
Max TOW	15,760/23,200 kg	34,746/51,272 lb
Maximum payload	5,000/9,700 kg	11,023/21,360 lb
Capacities		
Max fuel	6,268/8,648 liters	1,391/1,922 gal

Cargo

Cargo/quick-change version for LD-2, LD-3, LD-6 containers or two 2.235 meter (7.333 ft) pallets. Movable bulkhead permits mixed passenger/cargo operations. Rear-loading ramp facilitates.

Performance

Max cruise speed(b)	452/482 kmph	244/260 kt
Service ceiling	7,925 m	26,000 ft
T-O run to 10.7 m (35 ft)(c)	686 m	2,250 ft
Range, 44 passengers(d)	775 km	418 nm
Range, military(e)	960/2,310 km	518/3,130 nm

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Propulsion

CN-235	(2)	GE Aircraft Engines CT7-7 two-shaft, axial-centrifugal-flow turboprop engines, flat-rated to 1,267 kW (1,700 shp) (S/L, ISA) each.
CN-235-100/200/M/QC	(2)	CT7-9C turboprops, flat-rated to 1,305 kW (1,750 shp) each.
C-295	(2)	P&WC PW127G turboprops, 2,051 kW (2,750 shp) each at takeoff.

Seating

CN-235-100	40 passengers, four abreast, at an 81.28 cm (32 in) pitch, or 44 passengers at a 76.2 cm (30 in) pitch.
CN-235M	53 paratroopers or 41 fully equipped ground troops.
C-295	60 passengers, 69 paratroops, or 78 troops in high-density configuration.

(a)CN-235 only.

(b)At 4,575 m (15,000 ft).

(c)At S/L.

(d)With reserves for 185 km (110 nm) diversion and 45 min hold.

(e)With max payload, max cruising speed at 5,485 m (18,000 ft).

Variants/Upgrades

CN-235. Initial version built through mid-1988, powered by GE CT7-7As. Unimpressive speed, range due to weight growth; replaced by improved Dash 100.

CN-235-100. Production from late 1988. Up-rated CT7-9C engines in new composite nacelles for all-around hot/high performance increases. Military customers include Morocco, Brunei, France, and Turkey.

CN-235-200/220. High-gross-weight variant of Series 100; its stated range is with max payload of 830 nautical miles, reduced takeoff/landing distance. CASA certificated -200 in 1992; -220 is IPTN variant, certificated in 1996.

CN-235QC. Convertible 40-passenger/freighter to carry four LD-3 containers, three 88 inch x 108 inch pallets, or seven DHL Igloos. Max TOW slightly higher than standard CN-235-100. Payload is 10,360 pounds.

CN-235M. Personnel/cargo versions in several layouts: troop transport (53 ground troops or 41 paratroopers); transport with low-altitude airdrop capability; medevac with 24 stretchers and medical team; and forward patrol, with 22 fully equipped troops and one light vehicle. MTOW is 33,295 pounds while max payload is 11,025 pounds. France ordered eight. Turkey ordered 52 with provision for another 20 for civil operations. Other customers are Botswana, Chile, Ecuador, France, Panama, Saudi Arabia, and Spain.

CN-235MPA. Maritime patrol and anti-submarine warfare (ASW) derivative developed by IPTN. Equipped with Litton APS 504 360-degree search radar, GEC Sky Guardian electronic support measures system, TICM II FLIR, Boeing processing and display suite, two Aerospatiale Exocet AM 39 or Kongsberg Penguin anti-ship missiles, two AIM-9P Sidewinder air-defense missiles, and electronic warfare systems (ESM/ECM). Other ordnance pods optional. RACAL RAMS 4000 is optional. All systems are integrated by Boeing. Indonesia ordered six and Brunei ordered three.

Persuader. Advanced maritime patrol variant developed by CASA with the Irish Air Corps and Litton of Canada. CASA integrated mission and nav sensors using a central TDMS computer controlled from consoles that can be reconfigured to the aircraft's specific mission. Two aircraft delivered to Irish Air Corps for fishery surveillance and SAR roles.

C-295. Launched by CASA in mid-1997, a stretched (by 3 meters) derivative powered by P&WC PW127Gs. Compared with CN-235, offers 3.7 percent payload increase, 15-knot cruise speed increase, and 70-nautical-mile range increase. As currently planned, the C-295 will be strictly a military transport. The Spanish Air Force ordered nine in April 1999, followed by orders from the air forces of the Republic of Korea, Switzerland, Poland, Brazil, and the UAE.

Program Review

Background. The CN-235 evolved from a long international relationship. IPTN (now IAe) became a

CASA licensee for the C-212 Aviocar in 1976. This led to the establishment in 1979 of AIRTECH, a joint

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venture to design a commuter transport follow-on to the C-212. Each company budgeted \$40 million for the project.

CN-235 certification and first deliveries occurred in 1986.

Design Details. During development, weight inevitably increased, delaying first flight and initial deliveries by more than a year. Subsequently, CN-235s received higher-powered GE CT7s to offset the extra weight. Even this did not overcome market disappointment, and in 1992 CASA certificated another weight increase, which brought range and runway performance more in line with competitive aircraft.

Division of Labor. CASA and IAe were originally equal partners, with the respective governments contributing equally to the \$80 million (1980 dollars) development fund. CASA built both the front fuselage back to the wing trailing edge and the wing center section, and installed the engine. IAe was responsible for the rest of the aircraft. Major components were traded, with two production lines maintained.

In 1989, the partners modified their original agreement, which gave CASA rights in Europe and North America, and IAe all of the Far East. Now, each has exclusive

rights to its own domestic market, with both sharing all other market regions of the world.

The New C-295

In 1995, CASA announced a stretched (by 3 meters) variant now designated C-295, an all-military aircraft intended to replace aging Caribou, Fairchild C-119, and Alenia G.222 transports.

The C-295 is an all-CASA project. A prototype, a converted CN-235, flew in 1997, a production-standard C-295 flew in 1998, and Spain's Air Force ordered nine aircraft in April 1999.

USCG Order

In mid-2003, the U.S. Coast Guard ordered two CN-235MPAs from EADS CASA, and plans a total buy of 35 units. These will comprise the fixed-wing aircraft upgrade of the agency's fleet and will be fitted with sensors and other special mission equipment provided by Rockwell Collins.

The Coast Guard procurement program is expected to encounter rough seas in terms of funding availability, and many analysts harbor doubts that the full 35-unit complement will be acquired. The initial two aircraft are scheduled for deliveries in 2006.

Contracts / Orders & Options

In July 2005, Brazil ordered 12 C-295s valued at EUR238 million.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Oct	1979	AIRTECH established, CN-235 concept defined
Nov	1983	Flight of CASA-built prototype
Jun	1986	Spanish/Indonesian certification
Dec	1986	FAA certification
Dec	1986	Initial production deliveries
Early	1989	CN-235-100 deliveries begin
Summer	1992	CN-235-200 certificated
Dec	1997	Flight of CN-295 prototype
Dec	1998	Flight of production-standard CN-295
Apr	1999	Nine C-295s ordered by Spanish Air Force
Jan	2000	FAA, Spanish certification of C-295
	2001	Initial C-295 deliveries

Worldwide Distribution / Inventories

(As of April 1, 2006)

	<u>CN-235</u>	<u>C-295</u>		<u>CN-235</u>	<u>C-295</u>
Military (Identified)					
Botswana Defense Force	2		Panama National Guard	1	
Chile Army	3		Papua New Guinea	2	
Ecuador Army	2		Poland Air Force		8
France Air Force	18		Republic of Korea	20	
Gabon Air Force	1		Saudi Arabia Air Force	4	
Indonesia Air Force	5		Spain Air Force	32	9
Indonesia Navy	6		Turkey Air Force	49	
Ireland Government	2		Turkey Navy	6	
Jordan Air Force		2	United Arab Emirates	7	
Malaysia Air Force	12		Civil (Identified)		
Morocco Air Force	7		Binter Mediterranee	5	
Oman Police	2		Merpati Nusantara Air	10	
Pakistan Air Force	4				

Forecast Rationale

The New C-295

EADS CASA has delivered more than half of the 40 C-295 transports it has sold to date, and is competing vigorously with an Alenia/L-3 Communications team for the U.S. Army's upcoming Joint Cargo Aircraft (JCA) requirement.

The initial Army need is for 33 aircraft to replace its Shorts Sherpas. However, if that service also wants to replace its C-26s (modified Swearingen Metro 23 twin-turboprops) and C-12s (Beech King Air variant) and USAF orders some to replace its own C-12s and C-26s, we could see the long-term procurement of some 125 aircraft.

We believe the C-27J has the inside track and we are projecting the Alenia candidate as the finalist for the first increment of the U.S. Army's requirement, calling for 33 C-23 Sherpa replacements. It remains to be seen whether the full-blown JCA program will go forward and, if it does, what the inventory objective will be. We are not forecasting a full-blown FCA program at this time.

The C-295 is locked into about a half-dozen light cargo competitions with the C-27J, and this will be an interesting contest that bears watching over the next few years.

CN-235 Soldiers On

The Spanish manufacturer and Indonesian Aerospace (IAe), former partners on the CN-235, now compete with each other for sales in Asia, the Middle East, and

North Africa. The Republic of Korea and Libya are holding talks with both companies over anticipated new orders, while other likely prospects include Thailand, Bangladesh, Brunei, and Pakistan.

IAe. IAe is currently at a serious disadvantage, however, as it began 2006 with a mere three-unit order backlog. The last of these will be delivered in 2007, and thus it is critical for IAe to line up new orders, and quickly. A modest Indonesian Air Force buy could bail out the company in the short term. Failing that, Thailand is believed to be leaning in favor of IAe for an eight-to- ten-aircraft purchase.

We anticipate further IAE CN-235 sales and expect the company to bend every effort toward this end. IAe ceased production of the smaller C-212 last year, the long-planned N-250 regional transport has been shelved, and IAe will all but cease to be a player without additional CN-235 work.

CASA. The U.S. Coast Guard has ordered a pair of sensor-equipped EADS CASA CN-235s as part of that agency's Deepwater modernization effort, but funding constraints may hamper if not preclude long-range plans to ultimately acquire 35 aircraft.

Turkey still holds 10 CN-235MPA options but recently ordered a similar number of ATR-72 special mission variants. Whether the latter will simply augment or actually head off further MPA acquisitions remains to be seen.

The planned CN-235M sale to Venezuela has been a bone of contention between Washington and Madrid

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but, with some U.S. parts substituted, the deal is expected to go through. EADS CASA is also pursuing a potential 15-20-unit transport deal with Colombia and the CN-235M appears a more likely candidate than the larger, more expensive C-295.

In Spain, EADS CASA will continue to produce the CN-235 and C-295 models concurrently. While the total inventory goal of the USCG may not be met, we are projecting further CN-235 orders from that agency.

Neither EADS CASA nor IAe is expected to produce any more civil CN-235s; both will continue building military variants.

EADS CASA is projected to turn out 64 CN-235s, plus 112 C-295s, during the 2006-2015 timeframe. IAe will build an estimated 25 CN-235Ms during the same period.

Ten-Year Outlook

Civil

ESTIMATED CALENDAR YEAR PRODUCTION

Aircraft	(Engine)	thru 05	High Confidence Level				Good Confidence Level				Speculative		Total 06-15	
			06	07	08	09	10	11	12	13	14	15		
CASA (Consortium)														
CN-235(a)	CT7-7A	4	0	0	0	0	0	0	0	0	0	0	0	0
CN-235-100 (CIVIL)	CT7-9C3	8	0	0	0	0	0	0	0	0	0	0	0	0
CN-235-100/200 (CIVIL)	CT7-9C3	1	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - CASA (Consortium)		13	0	0	0	0	0	0	0	0	0	0	0	0
INDONESIAN AEROSPACE (Consortium)														
CN-235(a)	CT7-7A	14	0	0	0	0	0	0	0	0	0	0	0	0
CN-235-100/200 (CIVIL)	CT7-9C3	7	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - INDONESIAN AEROSPACE (Consortium)		21	0	0	0	0	0	0	0	0	0	0	0	0
Total Production		34	0	0	0	0	0	0	0	0	0	0	0	0

(a)Includes prototype/flight test aircraft.

Military

ESTIMATED CALENDAR YEAR PRODUCTION

Aircraft	(Engine)	thru 05	High Confidence Level				Good Confidence Level				Speculative		Total 06-15	
			06	07	08	09	10	11	12	13	14	15		
CASA (Consortium)														
C-295	PW127	23	10	10	12	12	11	10	12	12	11	12	12	112
CN-235M(a)	CT7-9C3	151	5	6	6	8	8	6	7	5	6	7	64	
Subtotal - CASA (Consortium)		174	15	16	18	20	19	16	19	17	17	19	176	
INDONESIAN AEROSPACE (Consortium)														
CN-235M	CT7-9C3	43	2	2	5	4	4	4	4	0	0	0	25	
Subtotal - INDONESIAN AEROSPACE (Consortium)		43	2	2	5	4	4	4	4	0	0	0	25	
Total Production		217	17	18	23	24	23	20	23	17	17	19	201	

(a)Includes Turkish assembly of a portion of 52 aircraft beginning in 1992.