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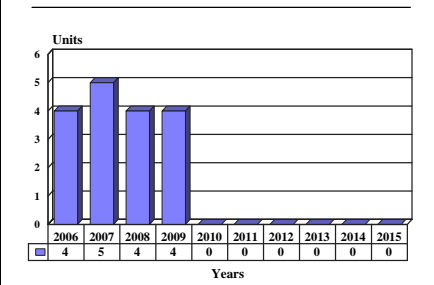
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Fairchild Dornier 228

Outlook

- Early 2005 approval for 11 more maritime surveillance aircraft
- HAL “anticipates” 50+ additional orders
- HAL was working with ATR on maritime version of ATR-42; status now unclear
- Indian Air Force to replace 228 with indigenous Saras design, which may also replace Coast Guard’s 228s

10 Year Unit Production Forecast
2006 - 2015



Orientation

Description. Unpressurized, 15- to 19-passenger, twin- turboprop regional/commuter, utility and special-purpose military transport aircraft.

Sponsor. Dornier privately sponsored Do 228 development and production.

Licensee. Hindustan Aeronautics Ltd, Kanpur Division, Kanpur, India.

Status. Production in India ended in 2003, resumed in early 2005.

Total Produced. Through 2000, Dornier and Fairchild Dornier sold and delivered 232 Dornier 228s. HAL license-built and assembled approximately 70 through 2005.

Application. Short-range regional/commuter and executive passenger transportation. Additional applications include commercial and military freight transportation, maritime and border patrol, airborne early warning, and SIGINT.

Price Range. Estimated \$6.0 million in 2006 dollars.



Do 228

Source: German Navy

Fairchild Dornier 228

Contractors

Prime

Hindustan Aeronautics Ltd	PO Box 225, Kanpur, 208008 India, Tel: + 91 512 6 7088, Licensee
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Subcontractor

Hellenic Aerospace Industry - Athens Office	http://www.haicorp.com , Athens Tower, 2-4 Messoghion Ave, Athens, 115 27 Greece, Tel: + 30 210 77 99 679, Fax: + 30 210 77 97 670, Email: marketing@haicorp.com (Flap)
Honeywell Aerospace Engines, Systems & Services	http://www.honeywell.com/sites/aero/Propulsion_Engines.htm , 111 South 34th St, Phoenix, AZ 85034 United States, Tel: + 1 (602) 231-1000, Fax: + 1 (602) 231-5713 (TPE331-5-252D Turboprop)
Philips Elec & Assoc Industries Ltd	Arundel Great Ct, 8 Arundel St, London, WC2R 3DT United Kingdom, Tel: + 44 1 689 2166 (Marec II Radar)
<p>Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.</p> <p>Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com</p>	

Technical Data

(228-100/200/212)

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Length overall	15.03/16.56 m	49.313/54.30 ft
Height	4.86 m	15.946 ft
Wingspan	16.97 m	55.678 ft
Cabin length	6.33/7.08 m	20.768/23.23 ft
Cabin height	1.55 m	5.086 ft
Cabin width	1.346 m	4.429 ft
Weight		
Weight empty	2,990/3,096/3,742 kg	6,592/6,825/8,249 lb
Max TO weight	5,980/5,980/6,400 kg	13,183/13,183/14,109 lb
Max TO weight (202)	6,200 kg	13,668 lb
Max TO weight (203F)	6,500 kg	14,330 lb
Max payload	2,217/1,853/2,201 kg	4,689/4,085/4,852 lb
Max payload (101/201)	2,117/1,903 kg	4,667/4,195 lb
Max payload (202/203F)	2,502/2,300 kg	5,516/5,070 lb
Capacity		
Standard fuel	2,386 liters	630 gal
Optional extra fuel	441 liters	116.5 gal
Performance		
Takeoff run to 15 m (50 ft)(a)	592/613 m	1,945/2,012 ft
Range, max fuel, 3,050 m (10,000 ft)(a)	1,740/1,000/2,224 km	939/539/1,199 nm
Max cruise speed, 3,050 m (10,000 ft)	428 kmph	231 kt

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Propulsion

Do 228-100 Series	(2)	Honeywell TPE331-5-252D single-shaft, centrifugal-flow turboprops rated 533 kW (715 shp), each driving a Hartzell four-bladed, constant-speed, fully feathering, reversible-pitch metal propeller.
Do 228-200 Series	(2)	Honeywell TPE331-5A-252D turboprops rated 578 kW (776 shp), each driving the same Hartzell propeller described above.

Seating

Commuter - 228-100/101 seat 15 to 16; 228-200/201/212 seat 19 or 20.

Executive - Various seating configurations for 6 to 12 passengers.

Military - Depending upon mission and equipment package.

(a)For -101/201, 212.

Variants/Upgrades

228-100. Original 15-passenger model sharing some commonality with Do 28 Skyservant, utilizing same main cabin door, cockpit equipment, fuselage sections.

228-101. Seats 16, certificated in August 1984 at max gross weight of 5,980 kilograms (13,183 lb).

228-200. Similar to -100, but with fuselage stretch of 1.524 meters (5 ft) to seat 20 passengers.

228-201. The 40th aircraft off the Dornier line, this was certificated simultaneously with -101 and at same max gross weight.

228-202. Compared with -201, this offers improved range/payload performance offset only by a slightly higher empty weight. Available from end of 1987.

228-203F. Announced for late 1987 availability, this freighter version features an additional crew door and higher payload/operating weights.

228-212. Similar to -201 but with increased landing weight to allow larger payloads for short-haul operations. Max TOW of 6,400 kilograms and landing weight of 6,100 kilograms, uses 776-shp TPE331-5A, and employs strengthened landing gear, fuselage, and wing components. Other improvements are carbon brakes, modified anti-skid system, modified hydraulics, new electrically driven rudder trim unit, and dual rear fuselage strakes to improve low-speed handling. Certificated in 1989.

Military/Government Variants. Dornier announced several military variants at Farnborough 1982. These are optimized for surveillance, maritime patrol, or special transportation roles in addition to normal utility transportation. Indian Coast Guard ordered 36 maritime patrol versions from HAL. Indian Air Force procured 25 HAL-built troop transports, while the Indian Navy acquired 30 fitted with anti-shipping missiles and Super

Marec radar for the anti-ship role. Royal Thai Navy ordered three MPAs from Dornier in 1990, and government of Mauritius took one from HAL for Exclusive Economic Zone (EEZ) surveillance.

Specific variants are as follows:

228 Maritime Patrol A. One of three basic MPAs on offer. The A is designed for radar surveillance and patrol of the 200-nautical-mile economic zone, and for search and rescue. Four crew; equipment includes left- and right-side bubble windows, anti-skid flooring, MEL Marec II search radar, radar console flight and navigation instruments, OMEGA nav system, Agiflite camera with ONS interface, and outboard wet wing with provision for 2,250 kilograms of usable fuel.

228 Maritime Patrol B. Designed for pollution detection and source identification, plus general surveillance and search and rescue. Equipment includes Ericsson SLAR IR/UV scanner, OMEGA, Nikon camera with navigation interface, a wet wing, and navigation/flight controls instrumentation at the SLAR and IR/UV consoles.

228 Maritime Patrol C. Designed specifically for fishery patrol, coast guard work, and search and rescue. Basic equipment same as for B, but with Bendix/King RDR 1400 weather radar with ground mapping.

228 SIGINT. Signal intelligence, electronic intelligence, and communications/intelligence gathering with AEG electronic system fit.

228 Military Transport. Offered with troop, paratroop, and air ambulance interiors. Troop variant seats 17, 20, or 22. Paratroop model seats 21 fully equipped paratroopers, plus a jumpmaster. Ambulance carries six stretchers, has nine seats for medical personnel and patients.

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Program Review

Background. Dornier's original Light Transport Aircraft (LTA) concept was for an 18- to 25-seat aircraft to compete in the light utility/commuter transport market into the 1990s. It would also have applications in freight/cargo, VIP and military transport, maritime surveillance, and search and rescue. The concept was expanded to encompass a family of light transports.

TNT Wing

In 1975, Dornier began development of an advanced-technology TNT wing (Tragflügel Neuer Technologies) resembling the supercritical airfoils of high-speed jet transports. The TNT wing, when used on aircraft operated in speed ranges up to about 509 kmph (275 kt), promised better lift and less drag than more conventional airfoils. TNT flight testing began in June 1979 and was completed in 1980. The wing was applied to the first of Dornier's family of light transports.

Indian Licensed Program

In 1983, Dornier and the Indian government signed an agreement covering licensed production of 228s by Hindustan Aeronautics Ltd (HAL). Through 1990, Dornier delivered 10 complete aircraft and 17 assembly kits, with the first Indian-assembled aircraft rolled out in 1985. The HAL program originally envisioned a minimum of 150 aircraft for operation by Vayudoot, Indian's third-level airline, and India's armed forces. Vayudoot received 10; HAL also has marketing rights to the aircraft in 30 other countries.

Additional Orders?

In March 2005, India's Coast Guard ordered 11 more 228s and the line was reopened to build these. In late 2005, HAL noted that it was anticipating orders for 56 additional 228s, presumably all for the Indian armed forces. The Indian Air Force plans to replace its 228 with the indigenous Saras design and the Coast Guard is reportedly considering a similar move which may well preclude further domestic 228 sales.

Contracts / Orders & Options

In March 2005, India's Cabinet Committee on Security approved the purchase of 11 aircraft for approximately \$166.25 million including spares, ground support equipment, and operational equipment.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Developments</u>
Early	1978	LTA development announced
Jun	1979	First flight tests of TNT wing
Mar	1981	Model 228-100 prototype first flight
May	1981	Model 228-200 prototype first flight
Feb	1982	Initial -100 deliveries
Late	1982	Initial -200 deliveries
Nov	1983	HAL licensed agreement signed
Aug	1984	German certification of -101 and -201 versions
Late	1985	First HAL-assembled 228 rolled out
Jun	1990	U.S. and French certification of Dash 212
Mid	1996	Fairchild acquires majority share of Dornier
	1997	All Dornier 228 production shifted to HAL
	2002	HAL licensed production resumed
	2003	HAL production ended
Early	2005	Production resumed to fill 11-unit order

Worldwide Distribution / Inventories

(As of May 1, 2006)

Military/Government

German Navy	4
Indian AF	26
Indian CG	15
Malawi Air Force	4*
Niger AF	1
Nigeria AF	6
Thai Navy	6

*In storage.

Forecast Rationale

In March 2005, the 228 line was reopened to fill an 11-unit order for India's Coast Guard. These aircraft are to be fitted out for the maritime surveillance role.

Collaboration with ATR

HAL was previously reported to be collaborating with the Franco-Italian ATR consortium on developing a maritime version of the latter's ATR-42 regional transport, but this project may have fallen by the wayside.

India has been developing the indigenous 15-19-seat Saras transport design and the country's air force plans to replace its 228w with this aircraft. India's Coast Guard is reported to be leaning in the same direction but may have to place attrition orders should the Saras continue to remain behind schedule.

Modest Attrition Order Anticipated

Our forecast assumes an additional modest order for the Coast Guard. Last year, HAL was reported to believe it would sell an additional 56 228s (no customer(s) identified) but we feel this is an overly optimistic number.

We anticipate the 11-unit Coast Guard order being completed by late 2007 and have factored in another eight aircraft for either that service, the Indian Navy, or both. During the 2006-2015 forecast period HAL is projected to produce 17 additional 228s.

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		
DORNIER														
228-100/101	TPE 331-5	28	0	0	0	0	0	0	0	0	0	0	0	0
228-200/-201 (CIVIL)	TPE 331-5	81	0	0	0	0	0	0	0	0	0	0	0	0
228-202 (CIVIL)	TPE 331-5	23	0	0	0	0	0	0	0	0	0	0	0	0
228-212 (CIVIL)	TPE 331-5	31	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - DORNIER		163	0	0	0	0	0	0	0	0	0	0	0	0
HAL (Licensee)														
228-200/-201 (CIVIL)	TPE 331-5	14	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - HAL (Licensee)		14	0	0	0	0	0	0	0	0	0	0	0	0
Total Production		177	0	0	0	0	0	0	0	0	0	0	0	0

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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		
DORNIER														
228-200/-201 (MIL)	TPE 331-5	29	0	0	0	0	0	0	0	0	0	0	0	0
228-202 (MIL)	TPE 331-5	9	0	0	0	0	0	0	0	0	0	0	0	0
228-212 (MIL)	TPE 331-5	31	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - DORNIER		69	0	0	0	0	0	0	0	0	0	0	0	0
HAL (Licensee)														
228-200/-201 (MIL)(a)	TPE 331-5	55	4	5	4	4	0	0	0	0	0	0	0	17
Subtotal - HAL (Licensee)		55	4	5	4	4	0	0	0	0	0	0	0	17
Total Production		124	4	5	4	4	0	0	0	0	0	0	0	17

(a) Does not include ten fly-away, and 17 kits delivered to HAL by Dornier.