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Douglas DC-3 Series

Outlook

- The DC-3 has unlimited years of service potential

Note: Icons indicate area(s) of current and potential retrofit/modernization activity



Orientation

Description. Twin-engine passenger/cargo transport.

Licensees. Showa-Nakajima Aircraft Co, Tokyo, Japan (L2D); GAZ-84 Government Factory, Khimki, USSR (Li-2).

Current Status. Series production ended in 1946.

Total Produced. Approximately 15,000 units were produced, including all variants.

Application. Transport (passenger and cargo), search and rescue, electronic warfare, research platform, and close air support.

Price Range. Basler Turbo 67 price: approximately \$5 million, depending on configuration (as of June 2007).

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Douglas DC-3

Source: Canadian Forces

Contractors

Prime

Boeing	http://www.boeing.com , 100 N Riverside, Chicago, IL 60606 United States, Tel: + 1 (312) 544-2000, Fax: + 1 (312) 544-2082, Prime
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

(DC-3C)

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
Length	19.66 m	64.50 ft
Height	5.17 m	16.96 ft
Wingspan	28.96 m	95.0 ft
Wing area	91.69 sq m	987.0 sq ft
Empty	8,038 kg	17,720 lb
Loaded	12,202 kg	26,900 lb
Performance		
Max speed	346 kmph	187 kt

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	Metric	U.S.
Normal cruising(a)	266 kmph	143 kt
Max range	2,205 km	1,189 nm
Propulsion		
Two Pratt & Whitney R-1830-92 radial engines		
Thrust (each)	894.8 kW	1,200 hp

(a) At 1,829 meters (6,000 ft).

Program Review

Background. A larger version of the DC-2, the DC-3 was initially called the Douglas Sleeper Transport. Since its beginnings as a civil passenger carrier, the DC-3 has been operated in a multitude of different roles. The aircraft has exhibited a high degree of reliability and resiliency throughout its existence.

In recognition of the longevity built into the design of the DC-3 airframe, several aircraft conversion companies have proposed DC-3 conversions that involve re-engining the aircraft with turboprop engines. Some early proposals involved Rolls-Royce Darts and Armstrong Siddeley Mambas. Newer programs involve Pratt & Whitney Canada PT6 series turboprop engines.

Variants

DC-3A/B. Pre-World War II civil passenger aircraft, approximately 800 of which were built.

DC-3C. Post-war civil conversion of the military C-47 Dakota.

C-47. Military version of DC-3. Has been operated by numerous air forces, primarily as a cargo or troop transport. Total of 10,048 aircraft built in the U.S.

BT-67 Turbo Dakota. Highly modernized model converted by Basler Turbo Conversion to include new engines, a stretched fuselage, a glass cockpit, and numerous structural improvements utilizing metal and composites.

AC-47D. Gunship used by U.S. in Vietnam for ground fire suppression. Armed with General Electric 7.62mm miniguns firing through the fuselage door aperture and windows.

AC-47T. Counterinsurgency variant of the ground attack aircraft in service with the Colombian SAPOL (Servicio Aéreo de Policia) and Air Force. Also referred to as the Basler BT-67.

C-117. Military VIP transport. Post-war designation for VC-47 wartime VIP transports.

R4D. U.S. Navy variant of C-47, used as a cargo and troop transport. Later used for research, radar countermeasures, and air/sea warfare training.

L2D. Japanese variant produced by Showa-Nakajima. Approximately 571 units were produced.

Li-2. Soviet version. Powered by two 1,000-horsepower M-621R nine-cylinder radials. Approximately 2,700 units were produced.

Milestones

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Dec	1935	First flight of Douglas Sleeper Transport (DC-3)
Oct	1938	First service delivery of C-47
Aug	1987	Aero Modifications receives U.S. FAA certification for multiple-use Supplemental Type

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Early	1990	Certificate for its DC-3-TP65 conversion Basler receives FAA Supplemental Type Certificate for the Basler Turbo 67 conversion

Worldwide Distribution/Inventories

Country	Operator	Designation	Quantity	Avg Age
AUSTRALIA	Australasian Jet Pty Ltd	DC-3C	1	66.00
AUSTRALIA	Discovery Airtours	DC-3C	1	67.00
AUSTRALIA	Qantas Airways Ltd (Spirit of Australia)	DC-3	1	68.00
AUSTRALIA	Shortstop Jet Charter Pty Ltd	DC-3 (C-47B-DK)	1	65.00
BENIN	Benin Air Force	C-47	2	65.00
BOLIVIA	Trans Aereos San Miguel Ltda	DC-3 (C-47A-DL)	1	67.00
BRAZIL	Royal Taxi Aereo Ltda	DC-3 (C-47B-DK)	1	66.00
BRAZIL	TAF - Linhas Aereas SA	DC-3C	1	68.00
CANADA	Air Manitoba	DC-3 (C-47B-DK)	2	66.00
CANADA	Air North	DC-3 (C-47A-DK)	1	66.00
CANADA	Air North	DC-3 (C-47A-DL)	1	67.00
CANADA	Aviation Boreal (Suspended Operations)	DC-3 (C-47B-DK)	2	66.50
CANADA	Buffalo Airways Ltd	DC-3	1	68.00
CANADA	Buffalo Airways Ltd	DC-3 (C-47A-DK)	5	67.60
CANADA	Buffalo Airways Ltd	DC-3 (C-47A-DL)	2	68.00
CANADA	Exeaire Inc	DC-3C	1	68.00
CANADA	Kenn Borek Air	DC-3 (C-47A-DK)	2	67.00
CANADA	Kenn Borek Air	DC-3 (C-47A-DL)	1	66.00
CANADA	Kenn Borek Air	DC-3 (C-47B-DK)	1	66.00
CANADA	Kenn Borek Air	DC-3C	1	67.00
CANADA	Trans Fair Inc	DC-3 (C-47A-DK)	1	67.00
CHILE	Aspar- Aeroservicio Parrague Ltda	C-47	1	65.00
COLOMBIA	Air Colombia Ltda	DC-3 (C-47A-DL)	3	66.67
COLOMBIA	Air Colombia Ltda	DC-3 (C-47B-DK)	1	66.00
COLOMBIA	Air Villavo Colombia	DC-3 (C-47A-DK)	1	65.00
COLOMBIA	Aliansa-Aerolineas Andinas SA	DC-3 (C-47A-DL)	2	67.00
COLOMBIA	Aliansa-Aerolineas Andinas SA	DC-3C	1	64.00
COLOMBIA	Alicol Colombia	DC-3 (C-47A-DL)	1	67.00
COLOMBIA	Colombia Air Force	Turbo 67 Conversion	8	65.00
COLOMBIA	Colombia National Police	Turbo 67 Conversion	4	65.67
COLOMBIA	SADELCA - Sociedad Aerea Del Caqueta Ltda	DC-3 (C-47A-DL)	1	67.00
COLOMBIA	SADELCA - Sociedad Aerea Del Caqueta Ltda	DC-3 (C-47B-DK)	2	66.00
COLOMBIA	SADELCA - Sociedad Aerea Del Caqueta Ltda	DC-3A	1	68.00

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Country	Operator	Designation	Quantity	Avg Age
COLOMBIA	SADELCA - Sociedad Aerea Del Caqueta Ltda	DC-3C	3	68.00
COLOMBIA	SAEP	DC-3-209B	1	73.00
COLOMBIA	Tampa Cargo SA	DC-3	1	71.00
CONGO, DEMOCRATIC REPUBLIC OF	Congo Democratic Republic of Air Force	C-47	4	65.00
COSTA RICA	SANSA-Servicios Aereos Nacionales SA	DC-3A	1	67.00
CUBA	Aerotaxi (Cuba)	DC-3 (C-47B-DK)	1	65.00
CUBA	Aerotaxi (Cuba)	DC-3C	1	67.00
EL SALVADOR	El Salvador Air Force	C-47	1	65.00
EL SALVADOR	El Salvador Air Force	Turbo 67 Conversion	1	65.00
EL SALVADOR	TAES - Transportes Aereos De El Salvador	DC-3C	1	67.00
GUATEMALA	Guatemala Air Force	Turbo 67 Conversion	2	65.00
HONDURAS	Aviac - Aerovias Centroamericanas SA	DC-3 (C-47A-DL)	1	68.00
HONDURAS	Honduras Air Force	C-47	2	65.00
HONDURAS	Setco - Servicios Ejectivos Turisticos Commander	DC-3	1	68.00
ICELAND	Icelandair ehf (Loftleidir Icelandic)	C-47	1	67.00
INDONESIA	DAS - PT Dirgantara Air Services	DC-3 (C-47A-DK)	1	66.00
INDONESIA	Indonesia Army	C-47	2	65.00
MALI	Mali Air Force	Turbo 67 Conversion	2	65.00
MAURITANIA	Mauritania Air Force	DC-3 (C-47A-DK)	1	66.00
MAURITANIA	Mauritania Air Force	Turbo 67 Conversion	1	65.00
NETHERLANDS	Dutch Dakota Association	DC-3 (C-47A-DL)	1	67.00
NEW ZEALAND	New Zealand Air Force	DC-3C	1	66.00
NEW ZEALAND	Pionair Adventures, Ltd	DC-3 (C-47A-DK)	1	68.00
NORWAY	Dakota Norway	DC-3C	1	67.00
PERU	TAS - Taxi Aereo Selva Srl	DC-3A	1	67.00
PORTUGAL	TAM-Transporte Aeroes Militars (Portugal)	DC-3	1	66.00
PUERTO RICO	Tolair Services Inc	DC-3 (C-47A-DL)	2	68.50
SOUTH AFRICA	Airquarius Aviation (Pty) Ltd (Branson Air)	DC-3 (C-47B-DK)	1	66.00
SOUTH AFRICA	Avia Air Charter Pty Ltd	DC-3C	1	20.00
SOUTH AFRICA	Comair Ltd	DC-3C	1	68.00
SOUTH AFRICA	Phoebus Apollo Aviation (Pty) Ltd	DC-3A-197	1	73.00
SOUTH AFRICA	Phoebus Apollo Aviation (Pty) Ltd	DC-3C	1	68.00
SOUTH AFRICA	Rovos Air	DC-3C	2	59.00
SOUTH AFRICA	Skyclass Aviation	DC-3C	1	66.00
SOUTH AFRICA	South Africa Air Force	C-47	11	65.00
SOUTH AFRICA	Springbok Classic Air (Pty) Ltd	DC-3C	1	65.00

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Country	Operator	Designation	Quantity	Avg Age
SWEDEN	Flygande Veteraner	DC-3C	1	67.00
SWEDEN	Vallentuna Aviation Club	DC-3C	1	65.00
SWITZERLAND	Ju-Air	DC-3 (C-47A-DL)	1	67.00
SWITZERLAND	Super Constellation Flyers Association	DC-3A	1	70.00
THAILAND	Thailand Air Force	Turbo 67 Conversion	9	65.00
TONGA	Peau Vava'U Air Ltd	DC-3 (C-47B-DK)	1	66.00
UNITED KINGDOM	Air Atlantique (UK)	DC-3C	2	66.50
UNITED KINGDOM	Atlantic Air Transport Ltd	DC-3C	2	65.50
UNITED STATES	Academy Airlines	DC-3A	1	72.00
UNITED STATES	Airborne Support Inc	DC-3 (C-47A-DL)	1	68.00
UNITED STATES	Airborne Support Inc	DC-3 (C-47B-DK)	2	66.00
UNITED STATES	Astro Airways Corp	DC-3A	1	69.00
UNITED STATES	Basler Airlines	DC-3 (C-47A-DK)	1	66.00
UNITED STATES	Basler Airlines	DC-3 (C-47A-DL)	2	67.00
UNITED STATES	Basler Airlines	DC-3 (C-47B-DK)	4	65.75
UNITED STATES	Brooks Aviation	DC-3 (C-47A-DK)	1	67.00
UNITED STATES	Capital Airlines	DC-3C	1	68.00
UNITED STATES	Central Air Service Inc (Arizona)	DC-3 (C-47B-DK)	1	65.00
UNITED STATES	Commutair (Continental Connection)	DC-3 (C-47A-DK)	1	27.00
UNITED STATES	Commutair (Continental Connection)	DC-3A	1	67.00
UNITED STATES	Dynamic Aviation	DC-3 (C-47A-DL)	1	66.00
UNITED STATES	Federal Aviation Administration - FAA	DC-3 (C-47B-DK)	1	65.00
UNITED STATES	Folsoms Air Service Inc (Suspended Operations)	DC-3A	1	67.00
UNITED STATES	Hangar 10 Inc	DC-3 (C-47B-DK)	1	66.00
UNITED STATES	Island Airlines Ohio	DC-3 (C-47A-DL)	1	67.00
UNITED STATES	Kamaka Air Inc.	DC-3D	1	66.00
UNITED STATES	Methow Aviation Inc	C-47	1	68.00
UNITED STATES	Miami Valley Aviation Inc - MVA	DC-3 (C-47A-DK)	1	66.00
UNITED STATES	Miami Valley Aviation Inc - MVA	DC-3 (C-47B-DK)	1	65.00
UNITED STATES	Missionary Flights International	DC-3C	1	67.00
UNITED STATES	Mohican Air Service Inc	DC-3C	1	67.00
UNITED STATES	Nord Aviation Inc	DC-3	1	67.00
UNITED STATES	Nord Aviation Inc	DC-3 (C-47A-DK)	1	66.00
UNITED STATES	Nord Aviation Inc	DC-3C	1	68.00
UNITED STATES	Otis Spunkmeyer Air	DC-3 (C-47B-DK)	1	65.00
UNITED STATES	Piedmont Air Cargo (Ceased Operations)	DC-3 (C-47A-DK)	1	66.00
UNITED STATES	Remote Area Medical Inc	DC-3 (C-47A-DK)	1	67.00
UNITED STATES	Rhoades Aviation Inc	DC-3	1	65.00
UNITED STATES	Southwind Airlines Inc	DC-3 (C-47B-DK)	1	66.00
UNITED STATES	Transnorthern LLC	DC-3	1	68.00

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Country	Operator	Designation	Quantity	Avg Age
UNITED STATES	Transnorthern LLC	DC-3C	1	66.00
UNKNOWN	Unknown	DC-3	1	71.00
VENEZUELA	Aeroejecutivos CA	DC-3 (C-47A-DL)	1	68.00
VENEZUELA	Aeroejecutivos CA	DC-3A	1	70.00
VENEZUELA	Aeroejecutivos CA	DC-3C	1	68.00
VIRGIN ISLANDS	Four Star Aviation	DC-3 (C-47A-DK)	1	66.00
VIRGIN ISLANDS	Four Star Aviation	DC-3 (C-47A-DL)	1	66.00
VIRGIN ISLANDS	Four Star Aviation	DC-3 (C-47B-DK)	1	66.00

Identified Retrofit & Modernization Contractors

Propulsion

Basler Turbo Conversions LLC	http://www.baslerturbo.com , 255 W 35th Ave, PO Box 2305, Oshkosh, WI 54903-2305 United States, Tel: + 1 (414) 236-7820, Fax: + 1 (414) 235-0381, Email: weigt@baslerturbo.com (Turboprop Conversion)
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Opportunities

Many DC-3s and C-47s are currently in storage, but a number remain in active service. Some of these aircraft could eventually be converted to turboprop power. Basler estimates that more than 500 DC-3/C-47 airframes exist that are good candidates for conversion.

The Honduran Air Force has been considering re-engining its C-47s with turboprop engines.

PROPULSION

Turboprop Conversion. The DC-3's potential for unlimited years of service makes this capable aircraft an excellent candidate for re-engining. Basler Turbo Conversions LLC, Oshkosh, Wisconsin, markets a DC-3/C-47 retrofit using 1,062-kW (1,424-shp) Pratt & Whitney Canada PT6A-67R turboprops. The company,

which obtained a U.S. Federal Aviation Administration (FAA) Supplemental Type Certificate (STC) for the conversion in February 1990, adds a 1.02-meter (3.33-ft) plug forward of the wing center section. The aircraft has a maximum useful load of 5,897 kilograms (13,000 lb). A new electrical system is installed, as is an upgraded hydraulic system. The fuel system is modified to enable it to accommodate jet fuel.

Basler calls its turboprop DC-3 the Basler Turbo 67, the Turbo Dakota, or the BT-67. Its price is approximately \$5 million, depending on configuration. Basler has completed more than 30 conversions. Customers have included Aero Contractors, the Colombian Air Force, the U.S. Forest Service, and United Technologies Corp.

The Colombia National Police took delivery of one BT-67 aircraft in mid-2006, under a \$7 million contract. The Colombian gunship version, known as the AC-47T, also features forward-looking infrared (FLIR) and night vision capabilities.

Basler also operates its own Maule M.7, which is utilized in BT-67 training services. Tom Weigt, president of Basler, expresses faith in the M.7 as an effective lead-in training aircraft. The firm maintains six DC-3Cs, available for conversion and sale.

Greenwich Aircraft Corp, Oxford, Mississippi, also markets a DC-3 turboprop conversion. Greenwich purchased the assets of Aero Modifications International

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(AMI), Fort Worth, Texas. AMI marketed a DC-3 conversion called the DC-3-65TP Cargomaster, for which the company received an STC in August 1987. Original research and development work for the modification was performed by Schafer Aircraft Modifications, Waco, Texas. AMI delivered seven DC-3 conversions.

The AMI DC-3 conversion featured 1,062-kW (1,424-shp) Pratt & Whitney Canada PT6A-65AR turboprops, each flat-rated to 917 kW (1,230 shp). The engines drove Hartzell five-blade constant-speed propellers, which featured the ability to feather, were reversible, had a de-icing capability, and were governor regulated. Maximum level speed was increased to 402 kmph (217 kt) at 3,049 meters (10,000 ft). The conversion also included a 1.02-meter (3.33-ft) fuselage plug installed forward of the wingroot to maintain the aircraft's center of gravity envelope. With the extension, the Cargomaster had a useful load of 5,352 kilograms (11,800 lb). The aircraft was (still) capable of operating from unimproved runways.

Other features of the DC-3-65TP included new circuits (to replace existing electrical wiring), AlliedSignal (Bendix/King) avionics, 118-gallon internal fuel tanks, a fire detection/extinguishing system, a dual-battery system, and a new throttle quadrant. AMI said that the converted DC-3 cost less to operate than a standard DC-3.

The Greenwich conversion is essentially the same as that which was offered by AMI, but with some

refinements. The major change is that Greenwich markets the conversion with a choice of engines: the PT6A-65AR or the PT6A-67R.

In January 1999, Greenwich awarded a \$7.2 million contract to AOG Air Support Inc, Kelowna, British Columbia, Canada, to modernize two DC-3s for redelivery in early 2000. The work was to include re-engining the DC-3s with PT6A-67R engines, adding a 1.02-meter (3.33-ft) fuselage plug, and installing a new 33-passenger interior. The two aircraft were to be utilized by an undisclosed operator in South America.

The South African Air Force (SAAF) re-engined at least 28 of its C-47s with PT6A-67R turboprops driving new five-blade propellers, using AMI plans. The fuselage of each C-47 was lengthened by 1.02 meters (3.33 ft) forward of the wing center section. The conversion also included upgraded avionics, a new electrical system, a new instrument panel, a one-piece windscreen, and fully overhauled landing gear, wiring, and hydraulic lines. All life items were zero-lifed. The modified aircraft seats 34-40 passengers, compared with the 27-seat original version, and cruise speed was increased to 185 knots from 150 knots. The South African firm Professional Aviation Services was the contractor for the SAAF C-47 turboprop conversion program; the conversion work itself was performed by the SAAF. Professional Aviation has also sold at least four civil DC-3 turboprop conversions.

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FI's Opportunity Outlook

PROPULSION													
Status		Thru 2009	High Confidence				Good Confidence			Less Confidence			Total
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Estimated Potential Candidates	143	Turboprop Conversion <> DC-3 <> Colombia <> Air Force											
Planned/In Progress		33	0	0	0	0	0	0	0	0	0	0	0
Speculative			4	3	0	0	0	0	0	0	0	0	7