

# ARCHIVED REPORT

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## Pratt & Whitney Canada PW901/PW980

### Outlook

- APU family used by very large airliners, including the Airbus A380 and Boeing 747
- Production of new A380s ended in 2021, and Boeing delivered the last 747 in February 2023
- The PW900 program will now shift to sustainment and support

### Orientation

**Description.** Twin-shaft, centrifugal-flow free-turbine turboshaft-based auxiliary power units (APUs).

**Sponsor.** Privately funded and sponsored.

**Status.** Production terminated.

**Total Produced.** An estimated 909 PW901s and 270 PW980s built through 2023.

**Application.** Heavy widebody commercial and military transport aircraft.

**Price Range.** PW901C, estimated at \$875,000.

### Contractors

#### Prime

<b>Pratt &amp; Whitney Canada</b>	<a href="http://www.pwc.ca">http://www.pwc.ca</a> , 1000 Marie-Victorin Blvd, Longueuil, Quebec, Canada, Tel: + 1 (450) 677-9411, Fax: + 1 (450) 647-3620, Prime
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#### Subcontractor

<b>Arconic Engines, Winsted Operations</b>	<a href="http://www.arconic.com">http://www.arconic.com</a> , 145 Price Rd, Winsted Industrial Park, Winsted, CT 06098 United States, Tel: + 1 (860) 379-3314, Fax: + 1 (860) 379-4239 (Blade, Stage 1 HP)
<b>Auxitrol Weston</b>	<a href="http://www.auxitrolweston.com">http://www.auxitrolweston.com</a> , 124 Victoria Rd, Farnborough, Hampshire, United Kingdom, Tel: + 44 1252 544433, Fax: + 44 1252 371216, Email: sales-advancedsensors@esterline.com (Thermocouple & Resistance Thermometer)
<b>Collins Aerospace Systems, Engine Components</b>	<a href="http://www.collinsaerospace.com">http://www.collinsaerospace.com</a> , 811 Fourth St, PO Box 65100, West Des Moines, IA 50265-0100 United States, Tel: + 1 (515) 274-1561, Fax: + 1 (515) 271-7201 (Fuel Nozzle)

## Pratt & Whitney Canada PW901/PW980

<b>Eaton Aerospace, Fuel &amp; Motion Control Systems Division</b>	http://www.eaton.com, 23555 Euclid Ave, Cleveland, OH 44117-1795 United States, Tel: + 1 (216) 692-6000, Fax: + 1 (216) 692-6331 (Fuel Pump)
<b>Parker Aerospace, Stratoflex Products Division</b>	http://www.parker.com, 700 Fourth St, Mansfield, TX 76063 United States, Tel: + 1 (817) 738-6543, Email: spdmarketing@parker.com (Hose)
<b>Unison Industries</b>	http://www.unisonindustries.com, 7575 Baymeadows Way, Jacksonville, FL 32256 United States, Tel: + 1 (904) 739-4000, Fax: + 1 (904) 739-4093 (Exciter & Ignition Plug)

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

## Technical Data

### Design Features

**Intake.** Radial screened plenum intake.

**Compressor.** A single titanium centrifugal-flow high-pressure compressor provides a mass flow of approximately 30 lb/sec (13.6 kg/sec) at a pressure ratio in the 5:1 to 8:1 range.

**Combustor.** Fully annular reverse-flow combustion chamber with heat-resistant nickel steel outer casing and liner. Dual ignition units, ignition plugs, and 14 piloted air-blast fuel nozzles.

**High-Pressure Turbine.** Single-stage axial high-pressure turbine derived directly from the JT15D-5 and incorporating directionally solidified blades.

**Low-Pressure/Power Turbine.** A single-stage unit derived from the JT15D program and matched to the requirements of the load compressor.

**Load Compressor.** A single centrifugal-flow load compressor that is also derived from the high-pressure unit of the JT15D. It provides all cabin pressurization and air conditioning and heating. Airflow to the load compressor is controlled by variable inlet guide vanes.

**Accessories.** A Full Authority Digital Engine Control (FADEC) system, in conjunction with a fuel metering system, allows for unattended operation. Electric starter motors are standard.

### Dimensions

	PW901A		PW980A	
	<u>Metric Units</u>	<u>U.S. Units</u>	<u>Metric Units</u>	<u>U.S. Units</u>
Length	1,956 mm	77.0 in	2,006 mm	79.0 in
Width (a)	1,118 mm	44.0 in	1,239 mm	48.8 in
Height (a)	1,321 mm	52.0 in	1,173 mm	46.2 in
Weight, dry	384.2 kg (b)	847 lb (b)	N/A	N/A

(a) Dimensions include intake plenum.

(b) Weight is with standard equipment.

N/A = Not Available

### Applications

<u>Model Variant</u>	<u>Power Rating (a)</u>	<u>Application</u>	<u>Units per Airframe</u>
PW901A	286 shp (118 kW) at 8,000 rpm	Boeing 747-400	1
PW901C		Boeing 747-8	1
PW980A	390 shp (290 kW) at 24,000 rpm	Airbus A380	1

(a) Power output is dependent on specific application.

## Pratt & Whitney Canada PW901/PW980

### Variants/Upgrades

**PW901A.** The PW901A is the initial model in the PW901 series; it was developed for the Boeing 747-400.

**PW901C.** The PW901C is a derivative of the PW901A designed for installation in the Boeing 747-8.

**PW980A.** A growth version of the PW901A, the PW980A was selected for the Airbus A380 in

August 2000. This APU's flow and materials have been enhanced, and an improved engine control was added.

The PW980A entered full commercial service on board the Airbus A380 in December 2007.

### Program Review

**Background.** United Technologies' Pratt & Whitney Canada surprised the commercial air transport world with the announcement of a contract from Boeing Commercial Airplane Company to design, develop, and produce a new airborne auxiliary power unit for the Boeing 747-400. In June 1986, P&WC received an award worth \$20 million to supply the new APU, designated the PW901A.

The PW901A derived much of its technology and performance from the P&WC JT15D-5 aviation turbofan engine. The core of the new APU is essentially that of the JT15D-5 with the addition of a dedicated load compressor, which is also based on the HP compressor of the JT15D-5. The low-pressure / power turbine, which drives the load compressor, improved the thermal efficiency and ultimately the output of the engine.

P&WC tested the first complete PW901A in December 1986; the first deliveries of production-standard engines were made in June 1988.

#### Applications

**Boeing 747-400.** The Boeing 747-400 is a long-range, four-engine, commercial transport aircraft capable of carrying 412-625 passengers depending on layout and configuration (normal configuration is 412 passengers in a 34-76-302 layout). Numerous variants of the 747-400 emerged (747-400, -400D, -400ER, -400F, and

-400M) during its production run. Boeing delivered the final -400 in 2009.

**Boeing 747-8.** Boeing's 747-8 Intercontinental is the final iteration of the long-serving jumbo airliner. It is 18.3 feet (5.6 m) longer than the -400 model it replaced, giving the -8I a typical capacity of 467 passengers in a three-class layout and a range of 8,000 nautical miles. New General Electric GENx turbofans provide thrust, and the -8F (Freighter) has 16 percent more interior volume than the -400F. The extra room allows the new model to carry four additional pallets on the main deck and another three on the lower deck.

Boeing delivered a combined total of 115 passenger and freighter versions before production ended in early 2023.

**Airbus A380.** The Airbus A380-800 is a four-engine, intercontinental-range, widebody commercial transport aircraft seating 544 passengers in a typical four-class layout. It is considerably larger than the Boeing 747 and is the largest passenger aircraft in production.

The range of the aircraft is 8,200 nautical miles (15,200 km) with 554 passengers. The -800 has a maximum takeoff weight of 1,267,645 pounds (575 tonnes).

Airbus officially launched the A380 program in December 2000. Deliveries began in 2007 and wrapped up in 2021 after Airbus delivered its 254th aircraft.

### Forecast Rationale

Airbus terminated production of the A380 in 2021, leaving Boeing's 747-8 as the sole remaining application for the PW900 family of APUs.

Sales of the 747-8 had long been very weak, and the firm order backlog for the jumbo jet had fallen to only

six aircraft by the end of 2021. Boeing delivered the final 747-8 in February 2023.

There are no other applications on the horizon, and production of new PW900 APUs is at an end. Pratt & Whitney will now focus on servicing the installed base of machines on the A380 and 747 fleets