Small air turbine generator

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A ram air turbine (RAT) is a small wind turbine that is connected to a hydraulic pump, or electrical generator, installed in an aircraft and used as a power source. The RAT generates power from the airstream by ram pressure due to the speed of the aircraft. It may be called an air driven generator (ADG) on some aircraft.[1]

Modern aircraft generally use RATs only in an emergency.[2] In case of the loss of both primary and auxiliary power sources the RAT will power vital systems (flight controls, linked hydraulics and also flight-critical instrumentation).[3] Some RATs produce only hydraulic power, which is in turn used to power electrical generators.

In some early aircraft (including airships), small RATs were permanently mounted and operated a small electrical generator or fuel pump. Some constant-speed propellers, such as those of the Argus As 410 engines used in the Focke-Wulf Fw 189, used a propeller turbine on the spinner to power a self-contained pitch governor controlling this constant speed.

Modern aircraft generate power in the main engines or an additional fuel-burning turbine engine called an auxiliary power unit, which is often mounted in the rear of the fuselage or in the main-wheel well. The RAT generates power from the airstream due to the speed of the aircraft. If aircraft speeds are low, the RAT will produce less power. In normal conditions the RAT is retracted into the fuselage (or wing), and is deployed manually or automatically following complete loss of power. In the time between power loss and RAT deployment, batteries are used.

They also power pod-fitted systems such as the M61A1 Vulcan cannon. Some free-fall nuclear weapons, such as the British Yellow Sun and Red Beard, used RATs to power radar altimeters and firing circuits; these were a more reliable alternative to batteries.

The Airbus A380 has the largest RAT in the world at 1.63 metres (64 in) in diameter, but around 80 centimetres (31 in) is more common. A typical large RAT on a commercial aircraft can be capable of producing 5 to 70 kW, depending on the generator. Smaller, low airspeed models may generate as little as 400 watts.

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