



## MORE ELECTRIC AIRCRAFT: HOW DOES ELECTRICITY WORK ON A PLANE?

News / Manufacturer



Through its subsidiary, Labinal Power Systems, Safran is working with aircraft manufacturers to develop a **more electric aircraft**. But how does electricity work on a plane? Serge Roques, an expert in Research & Technology at Labinal Power Systems, explains the essentials.

### Electric Power Generation

An airplane contains two major electrical circuits and one alternate circuit. The two circuits, one on each side of the aircraft, are linked to a generator. It is this generator that produces electricity, using the mechanical energy supplied by one of the engines. This is what we call electric power generation.

Labinal Power Systems (Safran) produces alternating-current (AC) and direct-current (DC) electrical power generators, as well as the corresponding Generator Control Units (GCUs) at its plants in Pitstone (UK) and Twinsburg (USA).

### Electric Power Distribution

The electricity produced by the generators is transported to the "electrical cores" by thick cables known as "feeders." These cores, which take the form of electrical cabinets or boxes, receive the electricity produced by the generators. They are manufactured by Labinal Power Systems in its Villemur-sur-Tarn (France), Pitstone and Chihuahua (Mexico) plants.

### **Interconnection**

260-amp direct- and alternating-current contactors supply both the primary distribution system (35-50 amps) and the secondary distribution system (3-15 amps). The electricity is then transmitted to the plane's equipment, this time via quite large-diameter distribution cables or smaller electrical harnesses. Labinal Power Systems produces primary and secondary distribution boxes, as well as assembling all the electrical harnesses that carry the current from the boxes to the aircraft's electrical loads. It is currently the only company on the market to offer such a wide range of products.

### **Conversion**

The onboard generators supply an alternating voltage of 115/230 volts (similar to that of a domestic electrical appliance) while the onboard control units require a direct voltage of 28 volts (comparable to that available in a car). A converter reduces the alternating voltage of the 115/230-volt generators to achieve an alternating voltage of 28 volts, and a transformer/rectifier then rectifies that to a 28-volt direct voltage. Labinal Power Systems supplies converters, as well as a whole range of power electronics and circuit protection components, produced in its Sarasota (USA) plant.

### **Alternate Power Source**

The generators are not the only means of electricity production on a plane. The APU (Auxiliary Power Unit), generally located at the rear of the aircraft, also produces energy to power the various onboard systems when the plane is on the ground, as well as supplying the energy necessary to start the engines. It can also be used in flight.

The RAT (Ram Air Turbine), a small turbine connected to an alternator, provides a further source of emergency power should generation from the engines stop working. If the primary and secondary energy sources fail, the RAT must produce the power necessary for the aircraft's vital systems (flight control, related hydraulic circuits and critical flight instruments). Labinal Power Systems produces Ram Air Turbines through the expertise of its US-based subsidiary, Aerosource.

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