# A320 [for example] HYDRAULIC SYSTEM INTRODUCTION

The aircraft has three independent hydraulic systems:

- green,

- yellow,

- blue.

The three hydraulic systems supply hydraulic power at 3000 psi to the

users:

- flight controls,

- landing gear,

- brakes,

- nose wheel steering,

- cargo doors,

- thrust reverser operation,

- Constant Speed Motor / Generator (CSM/G).

Hydraulic fluid cannot be transferred from one system to another. A reservoir in each hydraulic system is pressurized with air to prevent cavitation. The green and yellow hydraulic systems are each pressurized by an Engine

Driven Pump (EDP) 1 and 2. The yellow hydraulic system can also be pressurized by an electric pump.

It is mainly used on ground for maintenance and cargo door operation. If no electric power is available, a hand pump in the yellow system can be used to operate the cargo doors. A Power Transfer Unit (PTU) enables the green system to be pressurized by the yellow system and vice versa. It transfers the hydraulic power but does not transfer the hydraulic fluid. Fire shut-off valves are located between the reservoirs and the EDPs. They isolate the systems in case of an engine fire. The blue hydraulic system is pressurized by an electric pump. The electric pump is the main pump for the blue system. It starts running at first engine start or it can be manually activated on ground for maintenance purpose. Blue and yellow pumps are interchangeable. In an emergency, the blue system can be pressurized by the Ram Air Turbine (RAT). The RAT is deployed automatically or manually. It pressurizes the blue hydraulic system at 2500 psi. It can be retracted on ground only, following a specific maintenance procedure.

**SYSTEM OVERVIEW**

On the green system the normal source of pressure is the Engine Driven Pump (EDP) and as auxiliary source the Power Transfer Unit (PTU). On the blue system the normal source of pressure is the electrical pump (E-Pump) and as auxiliary source the Ram Air Turbine (RAT). NOTE: The blue electric pump can be used as an auxiliary power source for maintenance purposes on ground. On the yellow system the normal source of pressure is the Engine Driven Pump (EDP) and as auxiliary sources the Power Transfer Unit (PTU) and the electric pump (E- Pump). NOTE: The yellow system also has a hand pump dedicated to cargo door operation.

**PTU**

The Power Transfer Unit (PTU) is an auxiliary pressure supply for either the green or yellow systems without transfer of fluid between the two systems. It operates automatically if there is a delta pressure of 500psi between the green / yellow or yellow / green hydraulic systems. The side operating as a pump will take fluid from its associated reservoir and provide an output through the PTU manifold to the HP manifold. The motor side is supplied from the HP manifold through the PTU manifold, and is connected to the return system. Each section of the PTU has a case drain connection to the return system.

**RAT**

The Ram Air Turbine (RAT) is an auxiliary pressure supply for the blue system, and for the emergency electrical power CSM / G. It can be deployed automatically or manually depending on the failure conditions. The RAT is locked when extended. An index lock mechanism will only permit RAT stowage if the blades are properly aligned. It also prevents rotation when stowed. The index lock will release at approximately 5 degrees from the full extension position. Extension is by spring force. Retraction (stowage) is by blue hydraulic pressure. Up lock release is by solenoid operation. Down lock release is by hydraulic pressure.

**SERVICING**

**RESERVOIR AIR PRESSURIZATION**

All three reservoirs are pressurized to 50 psi to prevent pump cavitation. The non-return valves in each reservoir supply manifold, make sure that the pressure will be maintained for up to 12 hours after engine shutdown on ground, and for up to 3 hours following a failure of the air supply in flight. Each reservoir has a depressurization valve on its associated service panel. For long time depressurization, a depressurization tool may be installed on the depressurization valve. A 77-psi pressure relief valve is installed onto the supply manifold at each reservoir. All tree reservoirs are pressurized from Engine 1 for normal supply and the bleed air system for alternate supply at 43 psi. The air pressurization manifold has a ground supply connection. It is put into the blue hydraulic bay and regulates normal or ground supply to 50 psi. Cleanable filters have clogging indicators. There are two water drains, one is automatic after engines and APU shut down, and the other is manually operated. After maintenance on the hydraulic system, the reservoir pressurization can be done via a pneumatic ground cart connected to the reservoir pressure unit, the APU, or the pneumatic system ground connection.