॥ नमस्ते ॥


EMERGENCY
PRESSURE
GENERATION

- **Large aircraft with multiple hydraulic systems are designed to ensure hydraulic pressure to critical components even in the event of a complete system failure or loss of engines.**
- **Generally, electrically-driven pumps are used when engine-driven pumps fail. Should there be no working engines, not only would the engine driven hydraulic pump be inoperative but electrical generator output would cease as well.**
- **This may leave only the aircraft batteries to provide electrical power to the electrically driven pumps. However, it is common for large transport aircraft to be fitted with a ram air turbine (RAT) for yet again an additional source of hydraulic and electric power.**

Types Emergency Pressure Generation

- RAM AIR TURBINE (RAT)
- HYDRAULIC MOTORS
- POWER TRANSFER UNITS (PTUS)
- HYDRAULIC MOTOR DRIVEN GENERATORS (HMDGS)

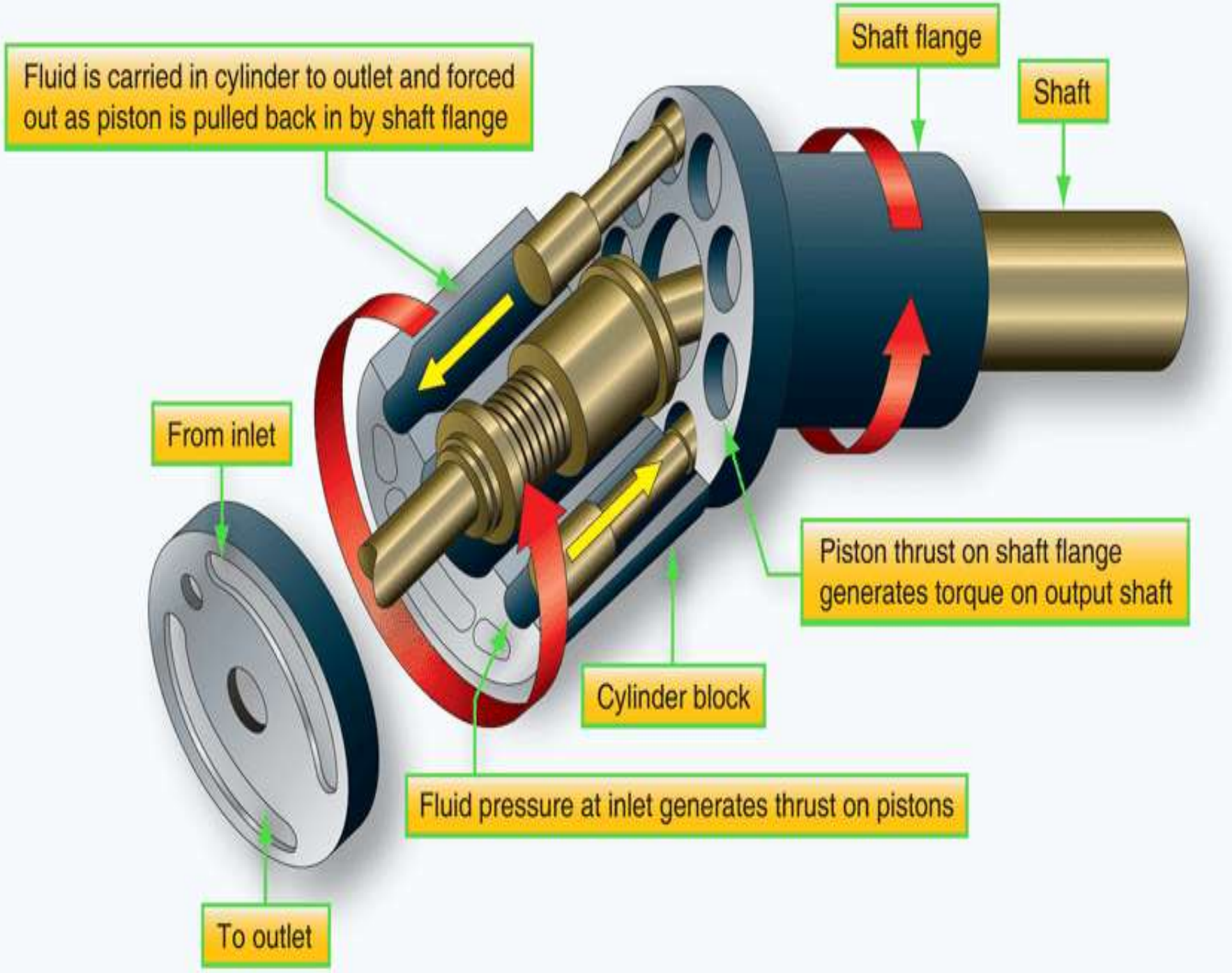
1.RAM AIR TURBINE (RAT)

- A RAT is installed in the aircraft to provide electrical and hydraulic power if the primary sources of aircraft power are lost.
- Ram air is used to turn the blades of a turbine that, in turn, operates a hydraulic pump and generator.
- The turbine and pump assembly is generally installed on the inner surface of a door installed in the fuselage.
- It Converts the kinetic & pressure energy of the atmospheric air into mechanical energy.

- The door is hinged, allowing the assembly to be extended into the slipstream by pulling a manual release in the flight deck.
- In some aircraft, the RAT automatically deploys when the main hydraulic pressure system fails and/or electrical system malfunction occurs.

2. HYDRAULIC MOTORS

- **Hydraulic fluid forced through the pump rotates the shaft of the pump, which as a result, makes the pump a motor.**
- **The motion of the shaft is then used to drive something to which it is attached. Piston type motors are the most commonly used in hydraulic systems.**
- **This is the same as hydraulic pumps except they are used to convert hydraulic energy into mechanical (rotary) energy.**
- **Hydraulic motors are either of the axial inline or bent-axis type.**
- **It takes high pressured fluid from another working hydraulic system.**


Fluid is carried in cylinder to outlet and forced out as piston is pulled back in by shaft flange
Shaft flange
Shaft
From inlet
Piston thrust on shaft flange generates torque on output shaft
Cylinder block
Fluid pressure at inlet generates thrust on pistons
To outlet

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3.POWER TRANSFER UNITS (PTUS)

- A hydraulic pump and hydraulic motor, are connected via a single drive shaft so that power can be transferred between two hydraulic systems.
- Depending on the direction of power transfer, each unit works as either a motor or a pump.

Working Principle

- The motor which turns the shaft of the pump that moves fluid through the second hydraulic system.
- Thus, power is transferred from one system to the other.
- While the PTU transfers power, it does not transfer any fluid from one system to the other.

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Some advantages of hydraulic transmission of power

- Over mechanical transmission of power are as follows:
- Quick, easy speed adjustment over a wide range
- while the power source is operating at constant (most efficient) speed Rapid, smooth acceleration or deceleration
- Control over maximum torque and power
- Cushioning effect to reduce shock loads
- Smoother reversal of motion

4.HYDRAULIC MOTOR DRIVEN GENERATORS (HMDGS)

- In case of an electrical failure, a hydraulic motor driven generator can be employed.
- An HMDG provides an alternative source of electrical power.
- The servo controlled variable displacement HMDG is an AC generator driven by the hydraulic motor portion of the unit.
- The generator part is typically designed to maintain the desired system **output frequency of 400 Hz.**
- Thus, an aircraft with an HMDG can maintain electrical power should a primary generator fail through the use of the hydraulic system. Conversely, a hydraulic pump failure is backed up by an electrically driven hydraulic pump.

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Did You Know?
#didyouknow
A SNAIL CAN SLEEP FOR UP TO 3 YEARS.


ANY
QUESTIONS?

धन्यवाद

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