# Chapter 1

# FUEL RECUPERATORS

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## ILLUSTRATION



### Introduction

**1.** Fuel recuperators are embodied in the fuel systems of aircraft to maintain the fuel supply under negative *g* conditions, or during the catapult launching of naval aircraft when the rapid acceleration may cause a fall in the low-pressure supply to the engine.

**2.** Depending on the particular requirements of the aircraft, a recuperator may be fitted in the fuel tank or located in the pipeline between the tank and the engine.

### Description and operation (*fig. 1*)

**3.** The body of the recuperator is a metal cylinder made in two portions which are bolted together by their flanges. A rubber sac is moulded to fit the interior wall of one half of the metal body and its flange is secured betweeen the flanges of the body.

**4.** External connections at one end of the recuperator are the fuel inlet/outlet, fuel pressure, fuel bleed to tank and a water drain. At the other end is an air inlet connection and a restricted vent to atmosphere.

**5.** The supply to the recuperator is taken from the pipe which carries low-pressure fuel to the high-pressure pump and therefore when the engine is running under normal conditions, the recuperator remains charged with fuel.

**6.** If the low-pressure fuel supply to the engine falls below normal pressure, air enters the recuperator through the inlet valve, displaces the rubber sac and expels the fuel which then supplements the supply to the high-pressure pump during the required period.

**7.** When normal flying is resumed, the low-pressure fuel supply is restored and this re-charges the recuperator by forcing the rubber sac back to its original position and expelling the air in the unit through the restricted atmospheric vent. To prevent any air-locks developing in the system, a small quantity of fuel is allowed to bleed back to the tank whilst the recuperator is being re-charged.

**8.** The air supply to the recuperator is kept constant at a pressure of, usually, 5 lb. p.s.i. and as the fuel tank pump supply exceeds this pressure, the unit is maintained fully charged with fuel during normal flight.

**9.** When the recuperator is installed on naval aircraft as a means of overcoming the momentary drop in the low-pressure which may occur during catapult launching, the air inlet valve has a larger aperture which is open to atmosphere. In this instance the unit is so positioned on the engine that the fuel is expelled from the rubber container by the rapid forward acceleration of the aircraft during the launch.

### Servicing

**10.** Apart from checking that there are no fuel leaks and that all connections are secure, no servicing of the recuperator is necessary.

**11.** To make a ground-run test when the unit is installed on the aircraft, run the engine at take-off r.p.m., switch off the fuel tank pump and check that the engine speed is maintained for the required number of seconds; this latter figure is given in either the aircraft or the E.C.U. Air Publication.

*(A.L.36, Aug. 56)*



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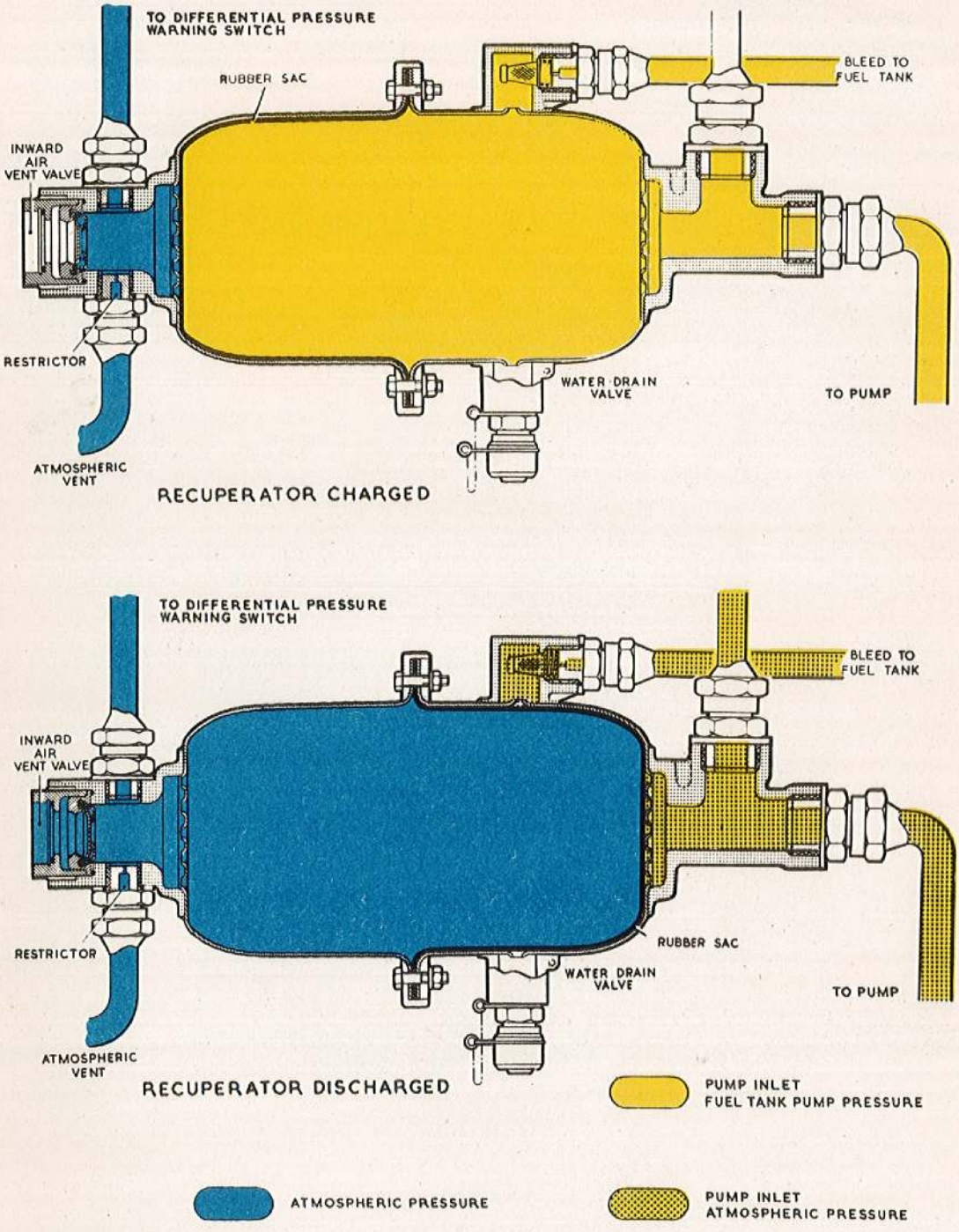


Fig.1 Fuel recuperator



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