



MANDATORY PERMIT DIRECTIVE

Number: 2016-001 R1

Issue date: 20 February 2017

In accordance with Article 41(1) of The Air Navigation Order 2016, as amended, the following action required by this Mandatory Permit Directive (MPD) is mandatory for applicable aircraft registered in the United Kingdom operating on a UK CAA Permit to Fly.

Type Approval Holder's Name: Rolls-Royce, de Havilland, Motorlet, Ivchenko	Type/Model Designation(s): Rolls-Royce Avon series, Rolls-Royce Viper series, Rolls-Royce Orpheus series, Rolls-Royce Nene series, Rolls-Royce Derwent series, de Havilland Goblin series, de Havilland Ghost series, Motorlet M701 series, Ivchenko AI-25 series
Title:	Engine Fuel System – Ageing Effects
Manufacturer:	Rolls-Royce, de Havilland, Motorlet, Ivchenko
Applicability:	Turbine engines of the following types fitted to ex-military jet aircraft: Rolls-Royce Avon series, Rolls-Royce Viper series, Rolls-Royce Orpheus series, Rolls-Royce Nene series, Rolls-Royce Derwent series, de Havilland Goblin series, de Havilland Ghost series, Motorlet M701 series, Ivchenko AI-25 series
Reason:	During an investigation following an accident involving a turbojet powered aircraft, CAA has been notified of significant deterioration in a rubber coated diaphragm used in the fuel pump of an engine fuel system. While not being considered a factor in the accident, the deterioration observed has been attributed by the engine manufacturer to ageing, chemical attack and air exposure. Such components were not lifed by the original manufacturer, since the extended calendar times in service now experienced in civil operation were not envisaged for the original military operation. Once fitted to an engine, the life of rubber or rubber coated seals and diaphragms can be affected by various factors including fuel type, operating environment, compression load and time. Stale fuel in contact with diaphragms and seals over long periods with the aircraft parked or stored causes attack of rubber parts due to reaction with the material.

Reason Cont:	Draining of fuel away from diaphragm and seal faces during periods of inactivity also leads to air exposure, loss of plasticity and subsequent cracking. During periods of inactivity, it is therefore important that regular running and/or inhibiting of fuel systems is carried out in accordance with the manufacturer's instructions. Note that many manufacturers specify the need for action to protect the fuel system after as little as 1 month of inactivity. Failure of an elastomeric component within a fuel system unit could lead to interruption of the fuel supply to the engine and therefore to partial or total engine failure. This unsafe condition, if not corrected, could lead to an emergency landing or the need to abandon the aircraft. Note: An unsafe condition is accepted by the CAA as: An unsafe condition exists if there is factual evidence (from service experience, analysis or tests) that: a) An event may occur that would result in fatalities, usually with the loss of the aircraft, or reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be: i) A large reduction in safety margins or functional capabilities, or ii) Physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely, or iii) Serious or fatal injury to one or more occupants unless it is shown that the probability of such an event is within the limit defined by the applicable certification specifications, or b) There is an unacceptable risk of serious or fatal injury to persons other than occupants, or c) Design features intended to minimise the effects of survivable accidents are not performing their intended function. For the purposes of this MPD, an unsafe condition is a "severe" failure of an elastomeric component such that continued safe flight and landing would be prevented. This MPD is raised to require a review of records of ageing fuel systems used on ex-military gas turbine jet engines to check that fuel system protection has been carried out in accordance with the manufacturer's instructions. At Revision 1 of this MPD, paragraph (2) has been amended to require the identification of any actions necessary as a result of "significant" failures and the provision of any necessary crew information. This action has been added to the MPD as it was considered that while "significant" failures are not unsafe conditions, in order to maintain an appropriate level of safety, they may still require crew actions to mitigate the failures. Paragraph (4) has been added as a result.
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