



Civil Aviation Authority

MANDATORY PERMIT DIRECTIVE



Number: 2018-004

Issue date: 24 May 2018

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	Type/Model Designation(s): Avon Mk 1 and 100 series Engines
Supersedure:	This MPD supersedes MPD 2016-002 dated 7 October 2016
Title:	Engine Stage 1 - 4 Compressor Blades and Discs - Inspection
Manufacturer:	Rolls-Royce
Applicability:	Avon Mk 1, Avon Mk 100 series (All applications)
Reason:	<p>CAA has been notified of a complete loss of thrust event on an Avon 100 series powered aircraft as a result of a compressor blade failure. The failure has occurred in a blade pin-hole attachment lug and was initiated by corrosion leading to subsequent fatigue. This region of the blade is below the platform and cannot be inspected by any in-situ inspection permissible under AMOC to MPD 2001-001/MPD2018-002. Other blades in the set were cracked due to corrosion and there have been other reports of corrosion initiated fatigue leading to failure in the forward stages of these engines in military service. The manufacturer developed modifications for protection of the blade attachment lugs during military operation. The failure occurred on an engine with a modification incorporated but over the extended time period of operation, which was not foreseen at the time the modification was developed, the protection had broken down and was no longer effective in protecting the pin-holes from corrosion.</p> <p>Compressor blade failure results in total thrust loss and, depending on flight phase, may result in loss of the aircraft. This MPD is raised to require an inspection of blade lugs on the first 4 stages of Avon Mk 1 and 100 series compressor blades. The discs are also to be inspected. This inspection requires engine removal and at least partial disassembly.</p> <p>This MPD supersedes MPD2016-002 as the time since overhaul (TSO) has been reduced from 20 years to 15 years to align with MPD 2018-002.</p> <p>It is also reworded to add clarity as which manuals/maintenance standards are applicable and removes the ability for the applicant to seek approval for alternative inspection methods from the CAA.</p>
Effective Date:	26 May 2018

Compliance/ Action:	<ol style="list-style-type: none">1. Within 1 month from the effective date of this MPD, determine from engine records the date of last engine overhaul. Note:Engine Overhaul here means overhaul in accordance with the Manufacturers Requirements (Ref. 1) If, following examination of the records, it can be shown that the engine was overhauled less than 15 years ago, no further action is required until the engine reaches 15 years since overhaul, at which time the following inspections must be carried out. If the engine exceeds 15 years since last overhaul, carry out the following inspections within 6 months or 20 flight hours from the effective date of this MPD, whichever limit is reached first.2. Remove the engine from the airframe in accordance with published aircraft manual instructions. Carry out a partial strip of the compressor in accordance with the manual requirements to permit inspection of the individual stage 1-4 blades and discs. Visually inspect individual blades and discs against the engine overhaul manual limits and reject from service any components which do not satisfy these limits.3. Carry out cleaning and NDT inspection of all remaining blades and discs in accordance with manual requirements. Reject from service all components which do not pass corrosion acceptance limits or NDT inspection.4. For remaining serviceable blades, protect stage 1-4 blade pin holes by applying protective coating in accordance with manufacturer's published data.5. Reassemble the engine incorporating serviceable blades and discs in accordance with manual requirements. Re-install engine and carry out a pass-off test in accordance with airframe manufacturer's published data.6. Repeat paragraph 2 (stage 1-4 blades and discs inspection) at intervals not to exceed 5 years, if the engine hour Time Between Overhaul limit has not been reached in that time.7. Compliance with this MPD shall be recorded in the aircraft/engine logbooks and future planned inspections should be included in the aircraft maintenance programme.8. From the effective date of this MPD, do not install any engine, unless it is determined, prior to installation, that the requirements of paragraphs 2 to 5 and 7 of this MPD have been carried out. <p>Notes:</p> <ol style="list-style-type: none">1. The inspections specified may only be carried out by a BCAR A8-23 approved organisation with a B1 Turbine Engine rating and the capability to carry out Rolls-Royce Avon series engine partial strip or overhaul under their terms of approval.2. The above tasks do not constitute a full overhaul of the compressor or the engine and the Time Since Overhaul must not be re-set on completion this maintenance action.
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	3. Throughout this MPD, “manual requirements” means the applicable servicing, repair and overhaul manuals for the variant of engine in work refer to “Reference Publications”.
ENSURE COMPLIANCE WITH THIS MPD IS RECORDED IN THE AIRCRAFT LOGBOOK	
Reference Publications:	Rolls-Royce Avon Engine Overhaul Manual Ref: O-Av100 Revision 66, 23 May 2002.
Remarks:	<ol style="list-style-type: none"> 1. This MPD supersedes MPD2016-002 which was posted on 16 March 2016 as PMPD 16-02 for consultation until 30 March 2016. 2. MPD2016-002 was issued on the 7 October 2016 with no effective date as CAA Safety Directive SD-2015/003, which required all operators of Hawker Hunter aircraft on the UK civil register to cease all flying operations, was current. This Safety Directive was cancelled on 6 July 2017. 3. A draft of this MPD was consulted on via the ex-military jet forums through 2017. 4. If requested and appropriately substantiated, the CAA may accept Alternative Methods of Compliance to this MPD. Application for an Alternative Method of Compliance (AMOC) must be made to the CAA and, if agreed, the CAA will issue a written acceptance that confirms the AMOC meets the necessary compliance requirements. 5. Enquiries regarding this Mandatory Permit Directive should be referred to: GA Unit, Safety Airspace Regulation Group, Civil Aviation Authority, Aviation House, Gatwick Airport South, West Sussex RH6 0YR. Tel: +44 (0)1293 573988 E-mail: ga@caa.co.uk