LIST OF WARNINGS

1. This manual contains the following warnings. It is your responsibility to be familiar with all of them.

OIL CONSUMPTION IN EXCESS OF 1 QUART IN 5 HOURS (0.05 GAL/HR, 0.19 LITER/HR) IS INDICATIVE OF SERIOUS INTERNAL LEAKAGE AND MUST NOT BE PERMITTED. INTERNAL OIL LEAKAGE CAN RESULT IN UNDETECTED INTERNAL OIL FIRES AND CAUSE DISASTROUS TURBINE FAILURES.

TO PREVENT ENGINE FUEL SYSTEM CONTAMINATION, WHICH COULD CAUSE ENGINE FLAMEOUT, AN EXTERNAL LOW PRESSURE FUEL FILTER SHOULD BE USED ON ANY AIRCRAFT REFUELING FROM REMOTE FUELING SITES (DRUMS ETC).

AT AMBIENT TEMPERATURES BELOW 4°C (40°F), SOME TYPE OF ANTI-ICE PROTECTION IS REQUIRED, SUCH AS AN ANTI-ICE ADDITIVE OR A MEANS OF AIRFRAME FUEL ICE ELIMINATION. ENGINE FLAMEOUT COULD RESULT FROM FAILURE TO USE ANTI-ICE PROTECTION. (REFER TO THE AIRCRAFT MANUAL FOR THEIR REQUIREMENTS.

MIXING OF OILS WITHIN AN OIL SERIES NOT IN THE SAME GROUP IS PERMITTED ONLY IN AN EMERGENCY. USE OF MIXED OILS (OILS NOT IN THE SAME GROUP) IN AN ENGINE IS LIMITED TO FIVE HOURS TOTAL RUNNING TIME. ADEQUATE MAINTENANCE RECORDS MUST BE MAINTAINED TO ENSURE THAT THE FIVE HOUR LIMIT IS NOT EXCEEDED. MIXING OF OILS FROM DIFFERENT SERIES IS NOT PERMITTED.

FAILURE TO COMPLY WITH OIL MIXING RESTRICTIONS CAN RESULT IN ENGINE FAILURE.

THE PRIMARY APPLICATION OF THE TURBOSHAFT ENGINE IS TO POWER A HELICOPTER OR ROTORCRAFT. A HEIGHT-VELOCITY DIAGRAM, AS REQUIRED BY REGULATION AND PREPARED BY THE AIRFRAME MANUFACTURER, IS PUBLISHED IN THE AIRCRAFT FLIGHT MANUAL PERFORMANCE SECTION. THE OPERATOR MUST BECOME FAMILIAR WITH THIS DIAGRAM TO DETERMINE WHAT ALTITUDES AND AIRSPEEDS ARE REQUIRED TO SAFELY MAKE AN AUTOROTATIONAL LANDING IN CASE OF POWER LOSS OR ENGINE FAILURE. THE ALTITUDE-AIRSPEED COMBINATIONS WHERE A SAFE AUTOROTATIONAL LANDING MAY NOT BE POSSIBLE ARE REPRESENTED BY THE SHADED OR CROSS-HATCHED AREA OF THE DIAGRAM.

SNOW OR ICE SLUGS CAN CAUSE THE ENGINE TO FLAME OUT. BE SURE AVAILABLE PREVENTIVE EQUIPMENT IS INSTALLED AND IN PROPER WORKING ORDER WHEN FLYING IN CONDITIONS WHERE SNOW OR ICE BUILDUP MIGHT OCCUR.

CONSULT THE AIRCRAFT FLIGHT MANUAL FOR REQUIRED EQUIPMENT AND PROCEDURES FOR FLIGHT IN FALLING/BLOWING SNOW.

SAND AND DUST WILL ERODE COMPRESSOR VANES AND CAUSE THEM TO FAIL.

SALT LADEN HUMIDITY AND CHEMICALS WILL CORRODE COMPRESSOR BLADES AND VANES AND CAUSE THEM TO FAIL.

TO PREVENT SERIOUS ENGINE MALFUNCTION OR CRUCIAL LOSS OF POWER, DO NOT OPERATE THE ENGINE IN EXCESS OF ANY SPECIFIED LIMIT.

HOT STARTS OR AFTERFIRES AFTER SHUTDOWN WILL CAUSE TURBINE BLADE AND WHEEL DAMAGE WHICH CAN RESULT IN ENGINE FAILURE.

TO PREVENT ENGINE FUEL STARVATION AND SUBSEQUENT FLAME-OUT, ANY AIRCRAFT REQUIRING FUEL BOOST PUMP(S) SHOULD USE THESE PUMPS AT ALL TIMES DURING FLIGHT OR AS DIRECTED IN THE AIRCRAFT FLIGHT MANUAL.

TO PREVENT CRUCIAL DELAY IN REGAINING POWER IF AN ENGINE FLAMEOUT IS ENCOUNTERED, AIRCRAFT EQUIPPED WITH AN AUTO-RELIGHT SYSTEM SHOULD KEEP THAT SYSTEM ACTIVATED AT ALL TIMES WHILE THE AIRCRAFT IS IN FLIGHT.

4 Inspect the combustion liner. Refer to Table 201, 72-40-00.

5 Reassemble the engine. Refer to Replacing the Combustion Liner, PARA 1., 72-40-00.

(b) Record the event, temperature, and duration in Part I of the Engine Log. Replace the 3rd-stage turbine wheel (regardless of P/N) and 4th-stage wheels P/N 23055944.

(9) Erosion and Corrosion Inspection

If the aircraft is frequently subjected to sand or dust ingestion or operated in a corrosive environment (salt laden or other chemically laden atmosphere such as pesticides, herbicides, sulphur, industrial pollutants, etc.), inspect compressor blades, vanes, and case plastic coating for erosion or corrosion damage. Engines operated in a corrosive environment must be subjected to daily fresh water compressor rinses. (Refer to Blade Damage, PARA 5.C., 72-30-00, Vane Damage, PARA 5.D., 72-30-00, Case Plastic Coating Inspection, PARA 5.E., 72-30-00, and Case Replacement, PARA 2, 72-30-00.)

NOTE: If the aircraft is subjected to sand or dust ingestion, periodic compressor erosion inspection is recommended. The frequency of the inspectionmust be based on the degree of ingestion and condition of the compressor at the last inspection. The need for more frequent compressor rinse can also be indicated.

NOTE: See CSL-1135 for instructions on suggested contamination removal using water only and for maps of operating areas with salt laden air.

NOTE: 10X power magnification is recommended for corrosion pit inspection.

(10) Snow Ingestion Inspection

Inspect the engine for snow, ice, or water damage as follows:

(a) Obtain access to the compressor inlet but do not disassemble any engine parts.

(b) Replace the compressor assembly if any mechanical damage, distortion, or bending is detected on the compressor front support vanes or first-stages rotor blades.

(11) On Condition Inspection - Power and Accessory Gearbox

Any time the gearbox housing is separated from the cover, all gears must be magnetic particle inspected if the log book indicates that more than 3500 hours have elapsed since the gears were new or last magnafluxed. Refer to M250-C20 Series Overhaul Manual, Pub. No. 10W3, for inspection criteria.

NOTE: Record compliance with this inspection in the appropriate section of the log book. Include date and hours.

(12) Compressor Inlet Air Blockage

Replace the compressor assembly if the engine has been operated with inlet air restricted due to foreign objects or materials which have become lodged in the compressor inlet. Tag the replaced compressor to indicate the cause of removal was inlet air blockage and send to a Rolls-Royce Authorized Maintenance Center. Conditions which constitute blockage are as follows:

(a) Foreign objects or materials found in the inlet during inspection of the aircraft when not in operation. If it can be determined that the blockage was not there during the last operation of the engine, remove the foreign object or material and leave the compressor in service.

(b) Power loss encountered following a restriction at the compressor inlet area while the engine is in operation. Blockage in flight can usually be verified by the inspection after landing (blockage still exists). However, some blockage can be followed by ingestion before inspection can take place. Objects or materials which were large enough to have stopped at the inlet guide vanes before ingestion, or which cause a noticeable raise in TOT, can be considered to have caused compressor inlet blockage.

5. Operating Precautions

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WARNING: SAND AND DUST WILL ERODE COMPRESSOR VANES AND CAUSE THEM TO FAIL.

WARNING: SALT LADEN HUMIDITY AND CHEMICALS WILL CORRODE COMPRESSOR BLADES AND VANES AND CAUSE THEM TO FAIL.

Observe the following precautions to reduce the danger of personnel injury or damage to the engine.

A. Before operating the engine, check the air inlet for foreign objects. (Refer to Compressor Inlet Air Blockage, PARA 1.D.(12), 72-00-00, Engine-Inspection/Check.)

B. If the engine does not operate within Operating Limits, PARA 6., this section, take the designated action.

C. If the aircraft is frequently operated in dusty or sandy areas, periodic erosion inspection is recommended. (Refer to Erosion Inspection, PARA 1.D.(9), 72-00-00, Engine-Inspection/Check.)

D. If a flameout has been experienced as the possible result of snow, ice, or water ingestion, refer to Snow Ingestion Inspection, PARA 1.D.(10), 72-00-00, Engine-Inspection/Check.

E. If the aircraft is being operated following an extended period of inactivity, refer to Special Inspections, Table 604, 72-00-00, Engine Inspection/Check, for recommended action.

F. If the engine is operated in a corrosive environment it must be subjected to a water wash. (Refer to Compressor Contamination Removal, PARA 6.A.(1), 72-30-00.)

G. If the installed engine will be shut down for more than five calendar days the compressor must receive an application of preservative. (Refer to Compressor Preservation, PARA 12.D., 72-00-00, Engine Servicing.)

6. Operating Limits

WARNING: TO PREVENT SERIOUS ENGINE MALFUNCTION OR CRUCIAL LOSS OF POWER, DO NOT OPERATE THE ENGINE IN EXCESS OF ANY SPECIFIED LIMIT.

NOTE: Operators may be faced with an engine that meets all specification power requirements in a certified test cell but apparently fails to meet the minimum installed power required by the aircraft flight manual.

NOTE: Please refer to the aircraft manual for other system troubleshooting.

NOTE: Operators should be aware that the FAA requires the Rolls-Royce Authorized Maintenance Centers to deliver engines of at least “specification horsepower” only after complete engine overhaul.

A. Engine Speed

If any of the following limits are exceeded send the designated engine components to repair/overhaul. Record extent of overspeed in the engine log book.

(3) Turn off all engine switches.

(4) After each engine shutdown, visually check that the propeller blades are fully feathered immediately after propeller rotation stops.

J. Normal Inflight Shutdown

Make a normal inflight engine shutdown as follows:

CAUTION: DO NOT MOVE THE POWER LEVER BELOW THE FLIGHT IDLE POSITION DURING FLIGHT.

(1) Retard the Power Lever to the FLIGHT IDLE position.

(2) From the FLIGHT IDLE position move the Fuel Cutoff Lever to the FUEL OFF position. The propeller will feather automatically when the engine shuts down.

(3) Turn off all applicable engine switches.

CAUTION: DO NOT WINDMILL AT 120-125 KNOTS INDICATED AIR SPEED FOR MORE THAN 13 MINUTES.

K. Emergency Inflight Shutdown

Make an emergency inflight engine shutdown as follows:

(1) Move the Fuel Cutoff Lever to the FUEL OFF position. The propeller will feather automatically and the engine will shut down.

(2) Leave the Power Lever in the flight range.

(3) Turn off all applicable engine switches.

L. Feathering

Propeller feathering will occur automatically with engine shutdown by positioning the Fuel Cutoff Lever in the FUEL OFF position.

M. Anti-Icing Air

Consult the aircraft operating manual for the outside air temperature (OAT) at which anti-icing air should be used. If the aircraft manual does not provide this temperature, use anti-icing air when flying into visible moisture at OAT below 5°C (40°F).

N. Emergency

If the engine power turbine governor should fail to function, resulting in a rapid N_2 speed increase, the Power Lever should be reduced to control overspeed.

(1) Manipulate the aircraft controls to control the aircraft.

(2) Monitor the N_2 speed and vary the Power Lever setting to maintain desired speed.

NOTE: The same power range is available using the Power Lever in emergency as in normal power turbine governing.

The engine power turbine governor can also fail in a decrease fuel flow condition. This can be recognized by decreased N_1 speed and decreased torque output with the throttle in the normal operating range. In this event, initiate emergency power loss power reduction procedures, as described in the aircraft flight manual.

9. Cold Weather Fuels

WARNING: AT AMBIENT TEMPERATURES BELOW 4°C (40°F), SOME TYPE OF FUEL SYSTEM ICING INHIBITOR (FSII) IS REQUIRED, SUCH AS AN ANTI-ICE ADDITIVE OR A MEANS OF AIRFRAME FUEL ICE ELIMINATION. ENGINE FLAMEOUT COULD RESULT FROM FAILURE TO USE AN FSII THAT AGREES WITH MIL-DTL-85470. (REFER TO THE AIRCRAFT MANUAL FOR THEIR REQUIREMENTS AND PARA 4.B., THIS SECTION, FOR APPROVED FSII.)

NOTE: Grade JP-4, Grade JP-5, and Grade JP-8 type fuels contain an icing inhibitor that agrees with MIL-DTL-85470. These fuels do not require more icing inhibitor unless specified by the airframe manufacturer.

CAUTION: MIL-G-5572 FUEL CONTAINING TRICRESYLPHOSPHATE (TCP) ADDITIVE MUST NOT BE USED.

(2) Emergency

Operation on ASTM D-910 AVGAS, all grades, is permitted for a maximum of six hours for each turbine overhaul period, if aircraft boost pumps are available and turned on.

WARNING: AT AMBIENT TEMPERATURES BELOW 4°C (40°F), SOME TYPE OF ANTI-ICE PROTECTION IS REQUIRED, SUCH AS AN ANTI-ICE ADDITIVE OR A MEANS OF AIRFRAME FUEL ICE ELIMINATION. ENGINE FLAMEOUT COULD RESULT FROM FAILURE TO USE ANTI- ICE PROTECTION. (REFER TO THE AIRCRAFT MANUAL FOR THEIR RECOMMENDATIONS AND PARA 4.B., THIS SECTION, FOR APPROVED ANTI-ICE ADDITIVE.)

(3) Cold Weather

To make sure of consistent starts below 4°C (40°F) the fuels that follow can be necessary:

(a) MIL-DTL-5624, JP-4

(b) ASTM D-6615, Jet B

(c) Alternate Cold Weather Fuel: ASTM D-910 AVGAS and Jet A, A-1, JP-5, or JP-8 mixture. Refer to para 9. Cold Weather Fuels, for instructions on correct mixture and use of cold weather fuels.

NOTE: Grade JP-4, Grade JP-5, and Grade JP-8 type fuels contain Fuel System Icing Inhibitor (FSII) that agree with MIL-DTL-85470. These fuels do not require more FSII unless specified by the airframe manufacturer.

NOTE: Jet A, A1, JP-5, or JP-8 fuels are not restricted from use at ambient temperatures below -18°C (0°F); however, special provisions for starting must be made. (Refer to Aircraft Flight Manual.) Once started, engine operation on Jet A, Jet A1, JP-5, or JP-8 will be satisfactory in outside air temperatures down to -32°C (-25°F).

NOTE: Prolonged and uninterrupted operation with only AVGAS mixture will induce lead buildup on turbine parts. This lead buildup can cause a gradual power reduction; consequently, this AVGAS mixture must be used only for cold weather operation. During operation with normal Jet A type fuel, the lead will slowly dissipate.

(4) Fuel System Icing Inhibitor (FSII):

(a) FSII additives that agree with MIL-DTL-85470 are approved for use in the M250 series engine if used in accordance with the additive manufacturer instructions and if approved by the airframe manufacturer.

NOTE: Grade JP-4, Grade JP-5, and Grade JP-8 type fuels contain FSII that agrees with MIL-DTL-85470. These fuels do not require more FSII unless specified by the airframe manufacturer.

(b) Fuel additives (Russia) Fluid I (Ethylene glycol monoethyl - GOST 8313) and Fluid IM (a mix of 50% Liquid I and 50% methyl alcohol-TU-6-10-1458) with a concentration of 0.1-0.3% by volume are approved for anti-icing with GOST 10227, Grades TS-1 and RT (Russia). No other fuel additives are Rolls-Royce approved.

(c) STAS 5639-88, Romanian TH fuel is comparable to ASTM D-1655 except the TH fuel could have lower lubricity which can lead to increased wear in pumping elements of the fuel pump and fuel control. Rolls-Royce recommends the first fuel pump elements and fuel controls that reach TBO be sent to an AMC for analysis of possible gear wear.

(d) Approval to use GB6537-2006 includes the use of all additives designated in the specification, including those designated as T1602, T1502 and T1601. This approval has been granted based on a technical assessment of these additives and satisfactory in-service experience.