GENERAL - AIRWORTHINESS LIMITATIONS

TASK 5-10-00-200-801

1. Airworthiness Limitations Section

SUBTASK 5-10-00-99G-005

A. General

(1) The Airworthiness Limitations section is FAA approved and specifies maintenance required under Section 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

(2) The FAA has approved service life-limit cycles and service life-limit hours for critical parts installed in the engine.

(3) Turbofan engines incur component stresses during normal operation. Accurate accounting of engine stress cycles and hours operated for turbofan engines ensures that no critical component remains in operation beyond its service life limit.

(4) Certain critical components of turbofan engines have service life limits. Critical components are those components whose failure could result in a situation which is not in compliance with FAR 33.75. These components may fail when subjected to repeated or alternating stresses (low cycle fatigue) or time operated at temperature (stress rupture). Stress cycles of engine critical components result from the transients of engine speed and temperature which occur at normal engine operation. Life limits expressed in ‘‘cycles’’ can be related to the number of stress cycles which occur from engine operation. Life limits expressed in hours can be related to engine operating time at temperature which occurs during normal engine operation. Life limits define the useful life of a component so that it is removed from service before possible failure.

(5) Honeywell has established life limits on critical components through analysis and/or test. It is imperative that operators maintain accurate records of life limited components. Honeywell has developed a cycle counting methodology to ensure accurate records of all engine cycles are maintained. (Refer to SUBTASK 5-10-00-200-001, Inspection.) This methodology requires that every landing be counted as one cycle. No component shall be allowed to remain in service beyond its defined life limit.

(6) Engine component life cycle and hour limits found in Paragraph 1.B. apply, and must be documented per applicable regulations or to the agreement of the operator’s local aviation authorities.

(7) In-service inspections will be conducted on critical components on a piece-part opportunity basis. Refer to Paragraph 1.D.

SUBTASK 5-10-00-200-001

B. Service Life Limits of Critical Parts

WARNING: HONEYWELL ASSUMES NO RESPONSIBILITY FOR ANY HONEYWELL EQUIPMENT WHICH IS NOT MAINTAINED AND/OR REPAIRED IN ACCORDANCE WITH HONEYWELL'S PUBLISHED INSTRUCTIONS AND/OR HONEYWELL'S FAA/SFAR 36 REPAIR AUTHORIZATION. NEITHER DOES HONEYWELL ASSUME RESPONSIBILITY FOR SPECIAL TOOLS AND TEST EQUIPMENT FABRICATED BY COMPANIES OTHER THAN HONEYWELL.

WARNING: INCORRECTLY REPAIRED COMPONENTS CAN AFFECT AIRWORTHINESS OR DECREASE THE LIFE OF THE COMPONENTS. INCORRECTLY FABRICATED SPECIAL TOOLING OR TEST EQUIPMENT CAN RESULT IN DAMAGE TO PRODUCT COMPONENTS OR GIVE UNSATISFACTORY RESULTS.

(1) Definitions

(a) A cycle is defined as a flight consisting of an acceleration to takeoff power, takeoff and landing. Use (or non-use) of thrust reverser does not change the cycle count. Engine starts and shutdowns for operation checks, ground maintenance and taxiing do not count against life limit cycles unless the engine is operated at takeoff fan speed. In that case, it counts as one cycle (each acceleration to takeoff fan speed from ground idle counts as one cycle). Other operational procedures affecting the life limit cycles of critical parts are counted as follows.

1 An air start is considered one cycle.

2 Each flight (takeoff and landing) counts as one cycle regardless of whether or not the engines are shutdown prior to the next takeoff.

3 A touch and go landing counts as one cycle.

4 An aborted takeoff counts as one cycle.

5 Every Automatic Power Reserve (APR) takeoff use counts as five additional cycles and 10 additional hours for engine operating hours.

NOTE: APR Operation is for use in emergency situations with one engine inoperative or low on power. It provides an extension of flat rated takeoff thrust from 30C (86F) to 35C (95F) ambient (at sea level conditions). APR use is to be counted if the actual N1 is greater than the normal takeoff N1 by 50 rpm. Use of APR shall be noted in the engine log book. Operators can maintain accurate records of APR actuations by downloading data recorded by the AS907 ECU's Engine Condition and Fault Reporting (EC-FR), entering the APR actuations in the engine log book, and calculating the corresponding cycles and hours.

6 Allowable rotor speed transients above maximum steady state limits count as five additional cycles. (Refer to SUBTASK 72-00-00-700-001, Table 1302, Page 1304, Testing.)

(b) When a life limited component is removed from service, the Life Limited Part Log Card must be updated and kept with the retired component. Forward a copy of the completed card to:

Honeywell International Inc. Reliability and Maintainability Dept. 93-42

111 S. 34th Street

Phoenix, AZ 85034

(c) Recording Cycles

1 The operator is responsible for maintaining an accurate record of cycles experienced during engine operation. The operator must also monitor part status to ensure that none of the parts listed in Table 801, Page 803 exceed the established life limit cycles.

2 The engine logbook provides forms for recording the engine cycle history.

3 The operator (or the facility providing engine maintenance for the operator) is responsible for making appropriate engine logbook entries to reflect changes in components.

(2) Service life limits are based upon engines operated within approved operating limits and maintained in accordance with Honeywell published instructions.

(3) The fan, high pressure compressor, high pressure turbine and low pressure turbine have specific critical components that are cyclic life limited.

(4) Engine parts that are life limited with finite cycle limits are specified in Table 801, Page 803.

Table 801. Service Life Limits for Critical Components

Component	Part No. (Applicable to all dash numbers.)	Service Limit (Cycles)
Spinner Cover Ring	3037101	15,000
Spinner Inner Ring	3037063	15,000
Fan Disk	3037077	15,000
Fan Seal Plate	3037079	15,000
Fan Stub Shaft	3037100 3037099	15,000
Stage 1 Compressor Blisk	3033053	15,000
Stage 2 Compressor Blisk	3033063	15,000
Stage 3 Compressor Blisk	3033067	15,000

Table 801. Service Life Limits for Critical Components (Cont)

Component	Part No.(Applicable to all dash numbers.)	Service Limit (Cycles)
Stage 4 Compressor Blisk	3033072	15,000
Vortex Sleeve (The Vortex Sleeve is a detail part of the Vortex Spoiler Assembly, Part No. 3033118. The Vortex Spoiler Assembly is an inseparable assembly.)	3033117	15,000
Vortex Spoiler (The Vortex Spoiler is a detail part of the Vortex Spoiler Assembly, Part No. 3033118. The Vortex Spoiler Assembly is an inseparable assembly.)	3033074	15,000
Vortex Spoiler Assembly (The Vortex Spoiler Assembly includes the Vortex Spoiler, Part No. 3033074, and the Vortex Sleeve, Part No. 3033117. The Vortex Spoiler Assembly is an inseparable assembly.)	3033118	15,000
Rotating Seal (Spacer, 2-3, Compressor Rotor	3033069	15,000
Rotating Seal (Spacer, 3-4, Compressor Rotor	3033070	15,000
Centrifugal Compressor Rotor (Impeller)	3033182 3033079	15,000
HP Shaft	3033084	15,000
HP Forward Coupler	3033133	15,000
HPT Stage 1 Seal Plate Coupler (Drive Arm)	3035030	15,000
HPT Stage 1 Seal Plate	3035124	15,000
HPT Stage 1 Disk	3035136	15,000
HPT Interstage Seal	3035134	15,000
HPT Stage 2 Seal Plate	3035109	15,000
HPT Stage 2 Disk	3035123	15,000
HPT Stage 2 Coupler	3035053	15,000
Rotating Seal LPT1/LPT2	3035595	15,000
LPT Shaft	3035689	15,000
LPT Stage 1 Disk	3035593	15,000

Table 801. Service Life Limits for Critical Components (Cont)

Component	Part No.(Applicable to all dash numbers.)	Service Limit (Cycles)
LPT Stage 2 Disk	3035661	15,000
LPT Stage 3 Disk	3035663	15,000
LPT Drive Arm	3035610	15,000
LPT Stub Shaft	3035691	15,000

NOTE: A life limited part log card must be maintained on each of these components. If one of these components is removed from the engine, the card must be updated and kept with the component. These cards are contained in the engine logbook.

(5) Life Limit, Engine Operating Hours Requirements

(a) In addition to the engine parts with life cycle limits, certain engine parts are life limited by the total engine operating hours accumulated on the parts. Table 802, Page 805 lists these parts and defines the maximum number of engine operating hours that may be accumulated on the parts.

(b) Each part in Table 802, Page 805 must be replaced prior to that part reaching the noted limitation in engine operating hours.

Table 802. Service Life Limits in Engine Operating Hours

Component	Part No. (Applicable to all dash numbers.)	Service Limit (Operating Hours)
N1 Overspeed Shut-off Detector	3038065	15,000

NOTE: A life limited part log card must be maintained on each of these components. If one of these components is removed from the engine, the card must be updated and kept with the component. These cards are contained in the engine logbook.

SUBTASK 5-10-00-200-003

C. Time Limited Dispatch

(1) The term Time Limited Dispatch (TLD) refers to the concept that FADEC systems may be allowed to operate with the fault(s) for a specified period of time, after which, appropriate repairs shall be made to restore the system to a fault free configuration.

(2) This section gives the FAA-approved time limits to operate this engine (Honeywell International model AS907-1-1A) with control system faults present. All faults are identified with their TLD fault category in this manual. (Refer to TASK 72-00-00-810-801, Fault Isolation.)

Table 803. Time Limited Dispatch Limitations

Fault Category	Operational Limitation
NO DISPATCH FAULTS	DISPATCH NOT ALLOWED WITH THIS CONDITION PRESENT. NOTE: A flight deck display of the presence of a no dispatch condition is required and is annunciated via a Crew Alerting System (CAS) message or an indication.
SHORT TIME FAULTS	DISPATCH IS ALLOWED WITH SHORT TIME FAULTS PRESENT. THE MAXIMUM EXPOSURE TIME OF THE SYSTEM TO THESE FAULTS MUST BE LIMITED TO 125 FLIGHT HOURS. NOTE: A MEL Maintenance Approach is to be used for all faults in the Short Time Dispatch (STD) category. An STD condition is annunciated via a CAS message or an indication.
LONG TIME FAULTS	DISPATCH IS ALLOWED WITH LONG TIME FAULTS PRESENT. THE MAXIMUM EXPOSURE TIME OF THE SYSTEM TO THESE FAULTS MUST BE LIMITED TO 500 FLIGHT HOURS. NOTE: The Periodic Inspection/Repair Maintenance Approach is being applied to long time faults, and the limitation relating to those faults is that they must be repaired within a time period sufficient to ensure that the maximum average exposure time of the system to the long time fault does not exceed 250 flight hours. The Maintenance Review Board Report (MRBR) has an established task to periodically inspect for long time faults every 400 flight hours. If faults are present when the system is inspected, the applicant can assume that those faults occurred half-way through the interval and are on average 200 flight hours old. If the maximum average exposure time of the system to these faults must be limited to 250 hours, then faults found during the 400 hour periodic inspection must be repaired within 50 flight hours to meet the maximum average exposure requirement. NOTE: The Honeywell E-Engine Interface (EEI) software must be used to perform the periodic inspection and ECU NVM download.

NOTE: The operator's local aviation authority may approve an extension, not to exceed 50 flight hours, to the long time dispatch limitation if repairs cannot be made.

NOTE: THE TIME LIMITATIONS SPECIFIED ABOVE MAY ONLY BE CHANGED WITH THE APPROVAL OF THE FAA ENGINE TYPE CERTIFICATE HOLDING OFFICE.

SUBTASK 5-10-00-200-004

D. In-Service Inspection Requirements

(1) Definitions

(a) For the purposes of these mandatory inspections, piece-part opportunity means:

- The part is completely disassembled when done in accordance with the disassembly instructions in the engine manufacturer's Engine Manual; and
- The part has accumulated more than 100 cycles in service since the last piece-part opportunity inspection, provided that the part was not damaged or related to the cause for its removal from the engine.

Example: An operator removes a 1st Stage Turbine Nozzle Assembly from the HP Turbine Assembly. This removal does not constitute an ''Opportunity'' to access the 1st Stage Turbine Nozzle Segments. However, if the operator is replacing a 1st Turbine nozzle outer support, then this action provides an ''Opportunity'' to access all of the 1st Turbine Nozzle Segments of the 1st Turbine Nozzle Assembly.

(2) Engine components that are to be inspected at piece part opportunity in accordance with the instructions provided in the applicable maintenance manual chapter are defined in Table 804, Page 807.

Table 804. Components Inspected at Piece Part Opportunity

Component	Part Number *	Inspection Instruction Details
Spinner Cover Ring	All Part Numbers	72-70-01, Inspection. (Refer to SUBTASK 72-70-01-200-001, Inspection.)
Spinner Inner Ring	All Part Numbers	72-70-01, Inspection. (Refer to SUBTASK 72-70-01-200-001, Inspection.)
Fan Disk	All Part Numbers	72-70-02, Inspection. (Refer to SUBTASK 72-70-02-200-001 and SUBTASK 72-70-02-200-003, Inspection.)
Fan Stub Shaft	All Part Numbers	72-70-10, Inspection. (Refer to SUBTASK 72-70-10-200-017, Inspection.)
Stage 1 Compressor Blisk	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-030, Inspection.)
Stage 2 Compressor Blisk	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-016, Inspection.)

Table 804. Components Inspected at Piece Part Opportunity (Cont)

Component	Part Number *	Inspection Instruction Details
Stage 3 Compressor Blisk	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-013, Inspection.)
Stage 4 Compressor Blisk	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-010, Inspection.)
Vortex Spoiler	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-007, Inspection.)
Centrifugal Compressor Rotor (Impeller)	All Part Numbers	72-30-10, Inspection. (Refer to SUBTASK 72-30-10-200-005, Inspection.)
HPT Stage 1 Seal Plate	All Part Numbers	72-51-01, Inspection. (Refer to SUBTASK 72-51-01-200-011, Inspection.)
HPT Stage 1 Disk	All Part Numbers	72-51-01, Inspection. (Refer to SUBTASK 72-51-01-200-006 and SUBTASK 72-51-03-200-002, Inspection.)
HPT Stage 2 Seal Plate	All Part Numbers	72-51-01, Inspection. (Refer to SUBTASK 72-51-01-200-010, Inspection.)
HPT Stage 2 Disk	All Part Numbers	72-51-01, Inspection. (Refer to SUBTASK 72-51-01-200-003 and SUBTASK 72-51-03-200-005, Inspection.)
LPT Shaft	All Part Numbers	72-55-02, Inspection. (Refer to SUBTASK 72-55-02-200-004, Inspection.)
LPT Stage 1 Disk	All Part Numbers	72-55-02, Inspection. (Refer to SUBTASK 72-55-02-200-016 and SUBTASK 72-55-03-200-006, Inspection.)
LPT Stage 2 Disk	All Part Numbers	72-55-02, Inspection. (Refer to SUBTASK 72-55-02-200-014 and SUBTASK 72-55-03-200-004, Inspection.)
LPT Stage 3 Disk	All Part Numbers	72-55-02, Inspection. (Refer to SUBTASK 72-55-02-200-010 and SUBTASK 72-55-03-200-002, Inspection.)
LPT Stub Shaft	All Part Numbers	72-55-02, Inspection. (Refer to SUBTASK 72-55-02-200-024, Inspection.)

Table 804. Components Inspected at Piece Part Opportunity (Cont)

Component	Part Number *	Inspection Instruction Details

* Refer to Table 801, Page 803 for applicable part numbers.

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