

Redelivery Considerations in Aircraft Operating Leases

Guidelines and Best Practices to Ease Transferability of Aircraft



By: Shannon Ackert

Abstract

A commercial aircraft operating lease sets forth processes for redelivery of the aircraft upon lease expiry in an effort to ease transferability of the asset to a new lessee. These processes consist of inspecting the aircraft and related documentation to confirm that the lessee has fulfilled its obligation to return the aircraft to the lessor in accordance with the redelivery conditions set forth in the lease. Upon satisfactory completion, the lessor executes a redelivery certificate confirming that the aircraft and related documentation complies with such redelivery conditions.

Matters relating to the redelivery of the aircraft can be a cumbersome and time-consuming ordeal. A well-organized process is vital to ensuring that both lessors and lessees effectively address the range of issues associated with redelivering an aircraft. This report examines guidelines and best practices applied by lessors to effectively manage the redelivery process of their aircraft assets. Key considerations are given to ensure technical integrity of the asset in an effort maximize aircraft remarkability.

Redelivery Considerations in Aircraft Operating Leases

TABLE OF CONTENTS

1. INTRODUCTION	2
2. REDELIVERY CONSIDERATIONS	3
2.1. Pre-redelivery Considerations	3
2.1.1. Pre-redelivery Meeting	4
2.1.2. Records Review	5
2.1.3. Aircraft Physical Inspection	10
2.1.3.1. Airframe Physical Inspection	10
2.1.3.2. Cabin Physical Inspection	11
2.2. Return Condition Considerations.....	12
2.2.1. Condition of Aircraft at Return	12
2.2.2. Certificate of Airworthiness Matters.....	17
2.2.3. Checks & Part Lives	18
2.2.4. Aircraft Documentation	24
APPENDIX A – AIRCRAFT DOCUMENTATION AND STANDARDS	25
APPENDIX B – EXAMPLE PHYSICAL INSPECTION REPORT	33
APPENDIX C – APPROVED VERSUS ACCEPTABLE REPAIR DATA	34
APPENDIX D – EXAMPLE LOPA & EMERGENCY EQUIPMENT DRAWING	37
REFERENCES	38

Redelivery Considerations in Aircraft Operating Leases

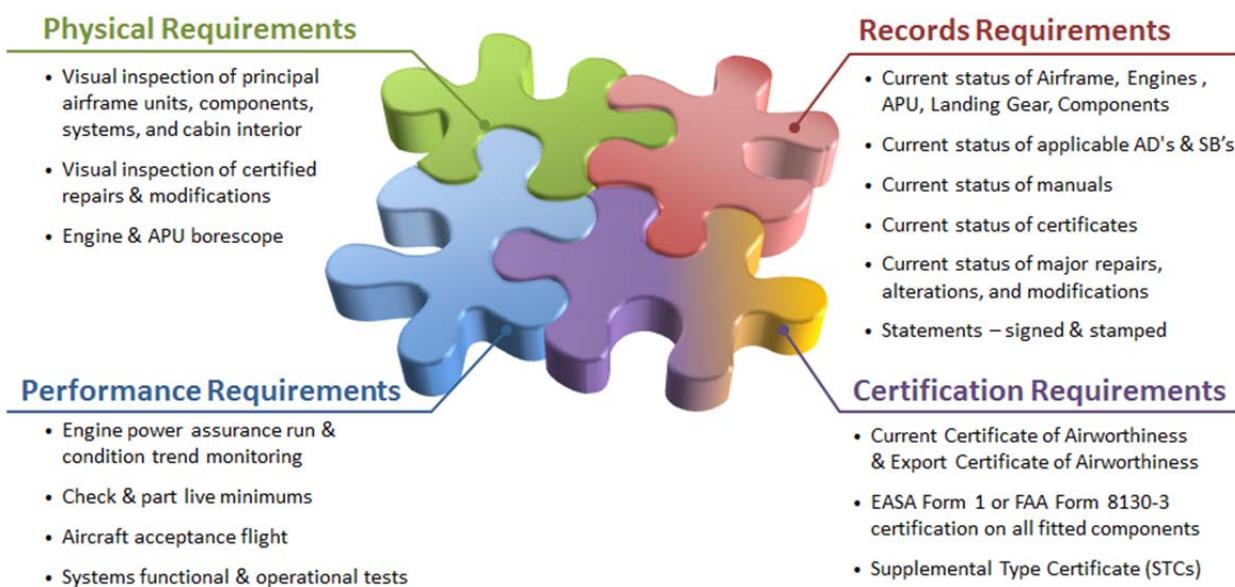
1. INTRODUCTION

Aircraft lease agreements specify redelivery conditions in an effort to ease transferability of the asset to a follow-on lessee. A common requirement at redelivery is for an aircraft to be capable of flying without major maintenance for a period of time generally consistent with a full C-Check interval. The technical points addressed in the lease agreement, such as the physical elements of the aircraft and the condition of the records, often form a large part of the discussion because they have financial significance for both the airline and lessor.

Most lease agreements contain “the usual suspects” of clauses that address the need to return the aircraft meeting certain technical redelivery requirements. Omissions or delays in addressing compliance with any of these requirements will affect the lessor in terms of effectively redeploying their asset. As illustrated in Figure 1, these requirements can be grouped into four categories consisting of:

1. Physical requirements, the focus being on effective assessment of the physical condition of the principal airframe units, its components, systems, and cabin interior,
2. Records requirements, the focus being on satisfactory audit of all aircraft records to ensure they comply with terms and conditions set forth by the lease and the regulatory authorities,
3. Performance requirements, the focus being demonstrating to lessor that the satisfactory operation of the aircraft and all systems are in compliance with the terms and conditions of the lease, and
4. Certification requirements, the focus being to ensure compliance with local regulatory authority requirements and, where cross-border transfers are concerned, compliance with the next lessee's regulatory requirements.

FIGURE 1- AIRCRAFT TECHNICAL REDELIVERY REQUIREMENTS



Redelivery Considerations in Aircraft Operating Leases

2. REDELIVERY CONSIDERATIONS

A commercial aircraft operating lease contains a host of clauses addressing the standards for redelivery condition of an aircraft at lease expiry. These clauses establish contractual considerations that an airline operator will need to comply with. The scope of these contractual redelivery considerations are illustrated in Figure 2, and categorized into: a.) Pre-redelivery and, b.) Return Condition Considerations.

FIGURE 2- SCOPE OF REDELIVERY CONSIDERATIONS



2.1 Pre-redelivery Considerations

A series of planned meetings should be established to address redelivery technical challenges (e.g. redelivery conditions, physical inspections, status of records, operator capability, etc.) with the objective to comprehensively assess and document the airplane status against lease return conditions.

During these meetings the lessor and lessee should develop and agree on detailed plans outlining processes and key milestones. It's also important to address any exceptions to these plans ahead of time in order to avoid lapses in timing and budgets. If applicable, these meetings should also include a detail analysis of compliance requirements associated with the new regulatory jurisdiction the aircraft will be operating in.

Operational Compliance Perspective

An aircraft is not allowed to fly for commercial operations unless approved equipment mandated by the regulatory authorities is installed. The minimum set of equipment is prescribed by ICAO, but the equipment also needs to meet the operation standards of the state of import. Some states have established additional requirements which do not fit into the standard transfer processes. Examples:

Age Limits - some states have introduced hard age limits for importing aircraft, and typically vary between ten to twenty years.

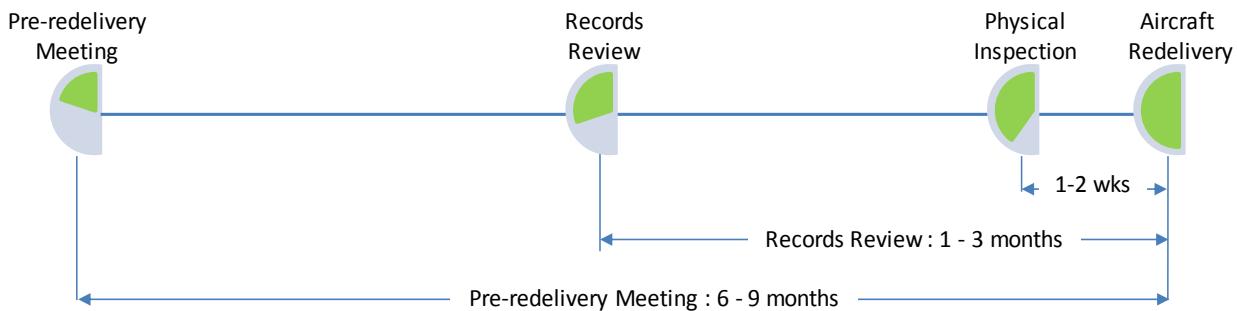
Local language placards and markings - many states require placards and markings in the aircraft, which are aimed at passengers, crew, and ground staff, to be in the local language.

Units of Measurement - ICAO has published units of measurement to prevent miscommunications. However, aviation industry standard shows most states use a system that differs from what has been internationally agreed.

Redelivery Considerations in Aircraft Operating Leases

Pre-redelivery considerations often form a large part of the overall discussions given they have financial significance for the airline and lessor. The schedule of events that make-up these considerations are illustrated in Figure 3 and further discussed in the following sections.

Figure 3 – Pre-redelivery Schedule of Events



2.1.1 Pre-redelivery Meeting

Plan for a pre-redelivery meeting between six and nine months in advance of the scheduled redelivery date. During the pre-redelivery meeting, the lessee should provide the lessor with the time and location of the redelivery check, and if applicable, the scheduled shop visits of any engine, APU or landing gear. It is during this period that the lessor should address the airworthiness of the aircraft, the contractual delivery and redelivery condition gaps, the status of high cost components, and the items which can potentially delay the aircraft handover.

During the pre-delivery meeting, lessor and lessee are advised to review the full terms of the lease return conditions with the aim of documenting and agreeing to all action items. In addition, the lessor should consider obtaining a technical report containing the following information:

- Workscopes for all upcoming maintenance events
- Current engine disk sheets, most recent engine shop visit & trend monitoring reports;
- Current drawings of the interior configuration of the aircraft;
- A copy of the lessee's current Approved Maintenance Program (AMP);

Example contract wording:

"For a period commencing nine (9) months and no less than six (6) months prior to the proposed redelivery date, Lessee and Lessor will agree to conduct a pre-redelivery meeting for the purpose of: a.) Reviewing the upcoming workscopes for the aircraft redelivery check and, if applicable, any engine, APU, or Landing Gear shop visit, and b.) Reviewing all documentation to be provided by the lessee in preparation for the upcoming Aircraft Documentation Review."

Redelivery Considerations in Aircraft Operating Leases

2.1.2 Records Review

Plan for a comprehensive records review to be accomplished with the lessee at least one to three months prior to the redelivery date. Aside from determining whether the aircraft is in condition for safe operation, the primary objective of the records review is to ensure completeness, accuracy, ease of understanding, consistency with industry standards, and compliance with mandatory regulatory requirements. Therefore, every attempt should be made to uncover errors, inconsistencies, deficiencies, or other concerns associated with the records that could affect the aircraft's value or remarketability.

The records review is the most time consuming element of the redelivery process to complete and is more often than not the sole cause of transition delays. Because records audit will be carried out separately from the aircraft inspections, the lessee should provide the lessor with the location of the airplane's records that are required to be reviewed.

The lessee should be required to provide records in an organized and consolidated manner, in one central room with access to telephone, photocopy, fax, and internet connections at the redelivery location. This will make it easier for the lessor representative to expedite review and ultimately make the redelivery process go more smoothly.

Example contract wording:

"For a period commencing three (3) months, but not earlier than one (1) month, prior to the proposed redelivery date and continuing until the date on which the Aircraft is returned to Lessor in the condition required by this Lease, Lessee will provide for the review of Lessor and/or its representative all of the Aircraft records and historical documents in one central room with access to telephone, photocopy, fax and internet connections at the Aircraft return location."

Aircraft Maintenance Records Perspective

Whenever maintenance, preventive maintenance, rebuilding, or alteration work occurs on an aircraft, airframe, aircraft engine, appliance, or component part, a maintenance record entry must be created.

A well-kept set of maintenance records, which properly identifies all previously performed maintenance, alterations, and AD compliances, is generally a good indicator of the aircraft condition. But more importantly, adequate aircraft records provide tangible evidence that the aircraft is in compliance with the appropriate airworthiness requirements.



Redelivery Considerations in Aircraft Operating Leases

The following is a list of documents that are most often subject to the highest level of scrutiny during the records review process.

A. Airworthiness Directive Status - A critical document in the aircraft records is the current status of applicable Airworthiness Directives (AD's)¹ The summary document should list the status of all (AD's) in chronological order by AD number. Ideally, the AD summary document should include the following information:

- Aircraft, Engine, APU or Appliance S/N
- AD Number & Effective Date
- AD Description
- AD Method of Compliance
- AD Reference (i.e. Service Bulletin Number, Engineering Documentation)
- AD Status (i.e. closed, open, N/A, etc.)
- AD Initial & Repetitive Threshold (i.e. calendar months, flight hours, flight cycles)
- AD Last Accomplishment (date, flight hours, flight cycles)
- AD Next Accomplishment (date, flight hours, flight cycles, intervals remaining)
- AD Remarks

In addition to the AD summary document, the auditor should also request the dirty finger print compliance paperwork used to record the accomplishment of each AD. This report will include the date, method of compliance, and the name and signature of the person who performed the AD.

¹ Aviation regulatory authorities (e.g. FAA & EASA) issue airworthiness directives when a specific condition has been discovered to exist on an aircraft. If this condition is not corrected, the safety of the aircraft could be jeopardized.

Temporary vs. Permanent Records Perspective

Temporary Records - these are records that must be kept by the owner until the work is repeated, superseded, or is subject to time limit (e.g. 1 year) that has transpired since the work was performed. These are typically records referring to maintenance, preventive maintenance, alteration, and all inspections. They include a description of the work performed; the date of completion; and the name, signature and certificate number of the person doing the return to service (RTS).

Permanent Records - these are records that must be retained by the owner during the time he or she operates the aircraft. They are transferred with the aircraft at the time of sale. Typically, these are documents relating to total time in service, current status of life-limited parts, time since last overhaul, current inspection status, current status of applicable AD notes, and major alterations.



Redelivery Considerations in Aircraft Operating Leases

- B. Service Bulletin Status - There should be a summary sheet showing the status of all manufacturers service bulletins (SB's) incorporated on the aircraft. The summary document should list the status of all (SB's) in chronological order by SB number. In addition to the status summary, you should have reference to the document (e.g. engineering order) used to accomplish each SB.
- C. Serialized Component Status List - Current list of the components which do not require replacement or maintenance at regular time intervals, but which do have a S/N. The list should identify, by P/N and S/N, the time since installation, time since new, and the time since shop visit.
- D. Certified Life-Limited Parts Status List - Current list showing the LLPs installed in each equipment (e.g. engines, landing gear, APU) to which it can be fitted along with the associated P/Ns and S/Ns. The list should identify the life limit, the hours and cycles accumulated, and the hours and cycles remaining.
- E. Maintenance Program Compliance – Compliance document verifying the status of each maintenance task to:
 - i. Determine no tasks are overdue and the aircraft falls within the contractual maintenance clearance period.
 - ii. Verify that the aircraft is not subject to a sampling program.
 - iii. Confirm repeat inspections of repairs & additional tasks linked to modifications are included.

Back-to-Birth Traceability Perspective

The term "**back to birth traceability**" describes documentation that demonstrates every owner and installation of a part all the way back to the time that it was manufactured.

Is Back-to-birth traceability always required?

A seemingly little-known fact within the aviation industry is that many regulatory authorities have no general requirements on back-to-birth traceability. This means that air carriers are free to establish alternative systems for establishing and tracking the time on parts. Ultimately, it is the owner or operator of an aircraft whom remains liable for assuring part airworthiness and it is the regulatory authorities (e.g. FAA, EASA) whom are responsible to substantiate that its recordkeeping system is sufficiently robust to assure accurate records.



So why do many lessors ask for traceability?

While there is no rule requiring traceability, there are rules requiring owner/operators to track the timing (e.g. flight cycles, calendar months, etc.) of their Life- Limited Parts (LLPs). And often back-to-birth traceability is the standard industry practice for tracking timing on LLPs. Lessors, in particular, tend to insist on LLP back-to-birth traceability for two commercial reasons.

1. Asset remarkability and the ability to seamlessly transition aircraft between regulatory jurisdictions are often cited as the leading factors that drive aircraft lessor's reliance of LLP back-to-birth traceability.
2. Residual value impairment, both related to decreased marketability and value impairment

Redelivery Considerations in Aircraft Operating Leases

- F. Hard-Time (HT) Component - The aircraft manufacturer will identify certain components that require a specific maintenance action (overhaul, inspection, test, etc.) at specified intervals. These components are referred to as hard-time components. The recommended actions must be documented and a summary status of these components be maintained in the aircraft records to track the date and time when the required action was last done and when it is next due.
- G. Engine Summary Data - Engine maintenance records showing the last performance restoration/overhaul of the engine, a summary status of airworthiness directives accomplished, and a summary status of any life limited parts installed in each engine to include the total hours and cycles and hours or cycles remaining until replacement.
- H. APU Summary Data - APU maintenance records showing the last overhaul of the APU, a summary status of airworthiness directives accomplished, and (if applicable) a summary status of any life limited parts installed in the APU to include the total hours and cycles and hours or cycles remaining until replacement.
- I. Landing Gear Overhaul Data - If the landing gear was previously overhauled, you must provide a copy of the last overhaul records of the landing gear. If there are life limited parts installed in the landing gear then you must provide a summary of the life limited parts installed. The records should identify the total cycles on the part and the cycles remaining until replacement.
- J. Modifications & Alterations - You must show that any major alterations or modifications were accomplished in compliance with approved (e.g. FAA, EASA) data and that the aircraft conforms to its type design requirements. Supplemental type certificates (STC), manufacturer's service bulletins, or other data approved by the aviation authority (e.g. FAA Form 8110-3) are examples of approved data.

Lost or Destroyed Records Perspective

Safekeeping of the records is an integral part of a good record keeping system. Occasionally, however, the records for an aircraft are lost or destroyed leading to costly and time consuming reconstruction.

In order to re-construct aircraft records, it is necessary to establish the total time-in-service of the airframe. This can be done by reference to other records that reflect the time-in-service; research of records maintained by repair facilities; and reference to records maintained by individual mechanics, etc. When these things have been done and the record is still incomplete, the owner/operator may make a notarized statement in the new record describing the loss and establishing the time-in-service based on the research and the best estimate of time-in-service.

- a. The current status of applicable AD's may present a more formidable problem. This may require a detailed inspection by maintenance personnel to establish that the applicable AD's have been complied with. It can readily be seen that this could entail considerable time, expense, and in some instances, might require re-compliance with the AD.
- b. Other items, such as the current status of LLPs, time since last overhaul, current inspection status, and current list of major alterations, may present difficult problems. Some items may be easier to reestablish than others, but all are problems.

Redelivery Considerations in Aircraft Operating Leases

- K. Repairs - You must show in the aircraft records that any repairs performed on the aircraft were accomplished in compliance with approved data. The aircraft manufacturer's structural repair manual (SRM) is considered approved data. Repairs not accomplished in accordance with the manufacturer's SRM must show evidence of approval of the repair data from the Compliance Authority (e.g. FAA Form 8110-3) and approval from the Airworthiness Authority of the State of Registration. Appendix C summarizes approved repair data under FAA and EASA regulations.

A repair map – often referred to as a Dent & Buckle Chart - is useful in showing the location of each repair and makes it easier to identify and review the supporting documentation. The map provides aid for flight crew and for line maintenance staff to determine status of actually visible damages, temporary or final repairs or missing components on the aircraft external structure.

- L. Interior Arrangement & Emergency Equipment List - Aircraft drawings should exist that show the current interior configuration status approved by the aviation authority. A engineering drawing called the "Layout of Passenger Accommodation" (LOPA) is the primary document used to illustrate the aircraft's cabin interior. The LOPA includes, but is not limited to, locations of passenger and flight attendant seats, emergency equipment, exits, lavatories, and galleys.

Often included with an aircraft's LOPA is a drawing called the "Emergency Equipment Drawing". This document maps the location of all the emergency equipment required (by regulation) to be installed on the aircraft.

- M. Interior Burn Certification - When an aircraft is built, the materials used in the interior and cargo compartments must meet certain regulatory flammability requirements. These regulations require materials to be fire resistant, which would allow passengers sufficient time to exit an aircraft in the event of a fire during an accident. If any of the seat covers, cushions, carpet, curtains, side wall panels, or cargo liners have been changed then it is important that you obtain paperwork attesting to the materials flammability compliance with the applicable regulations.

Computerized Records Perspective

There is a growing trend toward computerized maintenance records. Many of these systems are offered to owners/operators on a commercial basis. While these are excellent systems, alone they normally do not meet aviation regulatory requirements. This is because certain regulatory authorities need to be convinced that an electronic task card has signatures and typed findings that remain secure after sign-off.

Thus, the operator/lessee who uses such a system is required to ensure that it provides the information required, including signatures. If not, modification to make them complete is the operator's/lessee's responsibility and fiat responsibility may not be delegated.

Aircraft Record											
Aircraft - Airframe/Engine Log Maintenance Parts Squawks Reports Configuration											
Ach #/Serial #		Tail Number	Type	Category	Class	Checked	Due	Next	Next1	Next2	VOR
LEARJET100X	N9595S	U131	PT	HEL	ME	03/07/2008	04/06/2008	246	246	246	VOR
Max Hrs	Eng Cycles	Crash	Max PAV	Cost/Hr	Status	Type	Facility	Expo	Expo	Expo	
0	2	440	8	Severity	290 Rev	Dual VOR	None	0	0	0	
Main Systems											
Airframe/Engine Log Maintenance Parts Squawks Work Cards Condition Reports											
Flight # Date/Time Flight Hrs Hobbs Out Hobbs In Airframe Hrs Ldg APU Out APU In APU Hrs APU Cycles A/C Out A/C In A/C Hrs											
1393	02/26/2006 22:36	5.3	431.2	436.5	5.3	2	0.0	0	0.0	0	0.0
1394	03/01/2006 21:19	2.6	436.5	434.1	2.6	4	0.0	0	0.0	0	0.0
1395	03/02/2006 21:33	2.6	436.1	437.7	2.6	3	0.0	0	0.0	0	0.0
1396	03/08/2006 03:23	1.1	435.7	432.8	1.1	2	0.0	0	0.0	0	0.0
(double click or right click to view/ edit log entries)											
Hobbs Initial Standby Total Actual APU Ax.Cnd Engine 1 Engine 2											
Date	07/06/1995	@ Initial	0.0	0.0	0.0	0.0	0.0	0.0	435.2	430.1	
Ach Hrs	Current	4352.6							3960	3928	
Cycles											

Redelivery Considerations in Aircraft Operating Leases

2.1.3 Aircraft Physical Inspection

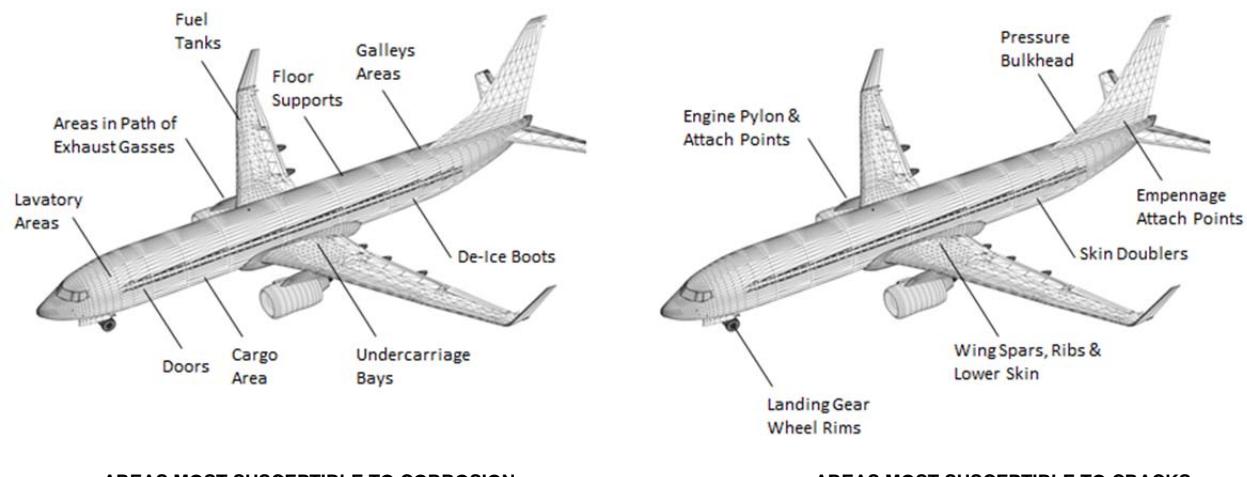
Plan for an aircraft physical inspection to be accomplished with the lessee coinciding with either removal of the aircraft from revenue service, or between one and two weeks in advance of the scheduled redelivery of the aircraft. The aircraft inspections tasks are generally visual in nature, consisting of a walk-around inspection to detect discrepancies and to provide an overall assessment of the condition of the aircraft's structure, its components, systems, and cabin interior.

The physical inspection provides an opportunity for the lessor to determine whether the aircraft is being maintained in accordance with the regulations governing that jurisdiction, and to establish any mismatch between the likely condition and contracted return condition as stipulated in the aircraft lease agreement. The aircraft physical inspection is often composed of an airframe and cabin physical inspection, each which is discussed in more detail in the following sections.

2.1.3.1 Airframe Physical Inspection

Figure 4 details locations of typical airframe defects which can be detected by a visual inspection. These defects generally consist of cracks and corrosion; painted surfaces, in particular, should be inspected for chipped, blistered paint for evidence of corrosion. Other defects, such as fuel and hydraulic leaks, system and component wear, accidental damage, environmental damage can also be detected visually. Other inspection activities include check and mapping of all dents and structural repairs. Appendix B details a checklist used for a typical physical inspection report.

Figure 4- Airframe Areas Requiring Physical Inspections



Redelivery Considerations in Aircraft Operating Leases

Example contract wording:

"The Aircraft inspection shall commence after its last revenue flight and continue until the date on which the Aircraft is returned to Lessor in the condition required by this Lease.

During the Aircraft inspection Lessor and/or its representatives will have an opportunity to observe functional and operational system checks, perform a visual inspection of the Aircraft (taking into account the Aircraft type, age, use and other known factors with respect to the Aircraft), and have the right, to the extent necessary in their reasonable opinion, to have additional panels or areas opened in order to allow further inspection by any inspecting party".

2.1.3.2 Cabin Physical Inspection

The objective of the cabin inspection program is to establish the condition of the aircraft's passenger cabin and to verify its conformity with the approved cabin layout. This visual inspection covers the general condition of all passenger seats, overhead bins, PSUs, galleys, closets, bulkheads and flooring panels.

Any defects, scuffs, gaps and mismatches between mating surfaces should be recorded in the detailed inspection report. The cabin layout should also be cross-checked with both the approved LOPA and the emergency equipment location drawings.

Many airlines develop their own cabin maintenance program that they integrate into their approved maintenance program. These programs establish maintenance tasks on a recurring schedule (e.g. A & C-checks), that generally cover:

- Cleaning and replacing of seat covers; seat cushions; seat belts, and tray tables
- Cleaning, inspection ,and refurbishment of seat frames, galleys, lavatories, closets & overhead bins
- Cleaning & inspection of panels (sidewall & dado) cabin dividers & overheads bins.
- Check & replacement of all lightings
- Check & replacement of all Passenger Service Units (PSU's)

Cabin Inspection Perspective

If the aircraft is scheduled to return coinciding with a heavy structural check than this allows for the opportunity to conduct a much more detailed assessment of the condition of cabin equipment; during these checks all cabin equipment must be removed to allow access for structural inspections. Large interior items like passenger seats, overhead bins, PSUs, galleys, closets, bulkheads and flooring panels are sent to shops to be inspected, cleaned and refurbished.



Redelivery Considerations in Aircraft Operating Leases

2.2 Return Condition Considerations

From a lessor's perspective good maintenance condition at return is fundamental to underpinning favorable residual value, and provides the best assurance for remarketing potential. A lease agreement will seek to contain provisions whose intention is to provide redelivery terms and conditions necessary to ensure the interest of the lessor are properly protected through comprehensive return conditions.

2.2.1 Condition of Aircraft at Return

There are numerous maintenance standards describing the condition of the aircraft at return, the scope of which ensures aircraft operational readiness and ease of transferability to a new lessee. Fair wear and tear accepted, the aircraft needs be returned to the lessor in the same general condition as it was when the aircraft was delivered. The following is a summary of primary return condition considerations along with example contract extracts:

A. Condition of Engines - The engines are the most expensive maintenance cost drivers and therefore warrant the greatest detail of information necessary in order to evaluate its maintenance status at redelivery. There should be no evidence of any condition which would cause the engine to be unserviceable, serviceable with an increased frequency inspection, or otherwise not meet the operational requirements as defined in the lease agreement.

- i. *The performance of a full and complete hot and cold section videotape borescope on each engine and its modules in accordance with Manufacturer's Aircraft Maintenance Manual (AMM).¹*
- ii. *The review of each engine's historical and technical records as well as condition trend monitoring data to verify that no abnormal deterioration exist in the performance of each engine*
- iii. *The requirement that each engine shall pass a magnetic chip detection inspection in accordance with the Manufacturer's Aircraft Maintenance Manual (AMM)*
- iv. *The requirements for a power assurance run on the engines in accordance with Manufacturer's Aircraft Maintenance Manual (AMM).*

¹ A full borescope is generally understood to be a complete video borescope and is used to check for signs of FOD, wear, thermal and mechanical damage. It ensures the physical integrity of principal parts such as compressor & turbine blades, guide vanes, nozzles and combustor chamber burner cans.

Redelivery Considerations in Aircraft Operating Leases

B. Condition of APU – Similar to the requirements established for engines, the standards for the APU are established to ensure that no abnormal deterioration in performance is evident at return.

- i. *The performance of an APU health check in accordance with Manufacturer's Aircraft Maintenance Manual (AMM) and a complete hot and cold section videotape borescope on the APU.*
- ii. *The requirement that each APU shall pass a magnetic chip detection inspection in accordance with the Manufacturer's Aircraft Maintenance Manual (AMM)*

C. Condition of Part & Components – Parts and components will require airworthiness approval tags. These tags are more commonly known as Certificates of Conformity (used only for newly built parts and components), or Authorized Release Certificates (for used parts and components); The EASA uses Form 1 and the FAA uses Form 8130-3 as the Authorized Release Certificate.

- i. *Parts fitted to the aircraft that are controlled by both part number and serial number shall have EASA Form One or FAA 8130-3 certification.*
- ii. *All time controlled and Life Limited Parts (LLPs) shall have EASA Form One or FAA Form 8130-3 certification and where applicable, traceability back -to-birth (although not FAA, EASA or ICAO required it is generally good policy to obtain back-to-birth records.)*

D. Condition of Airframe – Performance of visual inspections to detect discrepancies and to provide an overall assessment of the condition of the airframe's structure.

- i. **Fuselage** - *The fuselage shall be free of dents and abrasions which exceed the requirements of the manufacturer's Structural Repair Manual (SRM). The entire fuselage will be substantially free from corrosion and all mild and moderate corrosion found exceeding the limits of in the manufacturer's SRM will be adequately cleaned and treated and all severe or exfoliated corrosion shall be rectified in accordance with the requirements of the manufacturer's SRM.*
- ii. **Windows & Doors** – *Windows shall be free of delamination, blemishes, crazing beyond the limits set forth in the SRM and shall be properly sealed. Doors shall be free moving and correctly rigged in accordance with the AMM.*
- iii. **Wings and Empennage** - *Leading edges & flight control surfaces are free from damage exceeding the limits of the manufacturer's SRM. Wings shall be free of fuel leaks exceeding the limits of the SRM.*
- iv. **Thrust Reversers, Nacelles & Inlet Nose Cowlings** - *The thrust reversers, nacelles and inlet nose cowlings shall have detailed inspection of all structures, acoustical coverings, attachment points and faying surfaces for damage, corrosion and de-lamination. All repairs shall be performed in accordance with the manufacturer's AMM and/or the SRM.*

Redelivery Considerations in Aircraft Operating Leases

E. Condition of Interior, Cockpit & Cargo Compartments – Experience shows that condition of the interior is most contentious issue at redelivery. To mitigate disputes, it is recommended to describe the redelivery condition of the interior as clear and as precisely as possible.

- i. *Interior panels (including overhead bins, sidewall and ceiling panels, bulkheads and cargo compartment panels), and related seals (including window seals) shall be clean and newly painted if discolored or stained and free of holes, cracks, temporary repairs and dents. All interior panels will meet EASA and FAA fire resistance regulations.*
- ii. *Passenger service units (PSUs) will be serviceable and in good condition*
- iii. *Passenger seats will be serviceable, in good condition, secure & clean*
- iv. *Carpets, seat covers & cushions will be serviceable, in good condition, secure, clean, free of tears and stains and will meet EASA and FAA fire resistance regulations.*
- v. *All external placards, signs and markings will be properly attached, free from damage, clean and legible.*
- vi. *All galley catering inserts including trollies, containers, ovens, hot cups, coffee makers and water boilers shall be serviceable and in good working condition.*
- vii. *All cabin emergency equipment (including but not limited to, life vests, life rafts and emergency slides) and loose equipment shall be fully operational.*
- viii. *If so equipped, the cargo loading system shall be demonstrated to be fully functional. Cargo linings shall be free of holes, dents, gouges. Cargo nets will be in good condition with no tears or frayed areas.*
- ix. *All in-flight & audio entertainment systems shall be fully operative and all IFE seat functions will be serviceable.*

Fair Wear & Tear Perspective

The term **fair wear and tear** is often used to describe the physical elements of the aircraft. However, in the main, the concept is more apt to describe the physical condition of the interior, rather than the engineering aspects such as engine or landing gear condition, which are far less subject to interpretation. Condition of interior depends on age of the associated interior hardware and the way they have been maintained by the previous operator.

Given the subjectivity of fair wear and tear both lessors and lessees have become more focused on documenting more precise return conditions in their leases.



Redelivery Considerations in Aircraft Operating Leases

F. Condition of Airworthiness Directives – It is also common to expect a certain amount of post redelivery clearance for Airworthiness Directives (ADs). It is advisable that the clearance interval matches the period established for major equipment (e.g. airframe and engines), or for a period no less than one year.

- i. *All Airworthiness Directives applicable to the aircraft issues during the lease term requiring compliance either (a) before the redelivery date or (b) within 24 months after the redelivery date shall be accomplished on a terminating action basis.*
- ii. *No inspection shall be due under any Airworthiness Directive within 24 months after redelivery or, if shorter, a full inspection period under the relevant Airworthiness Directive.*

G. Condition of Repairs – Clearly define those repairs that are acceptable and those that are not, and make reference to the associated repair documentation.

"There will be no temporary, time limited or interim repairs on the Aircraft unless Manufacturer specifically recommends such repair. All repairs to the Aircraft will be accomplished in accordance with Manufacturer's Structural Repair Manual or:

- *EASA-approved data supported by EASA Repair Design Approval Sheets or its EASA equivalent.*
- *FAA-approved data supported by an FAA Form 8110-3 or FAA Form 8100-9."*

H. Condition of Modifications – Clearly define: a.) expected threshold over which the lessee will require prior written consent of lessor, and b.) those modifications that are acceptable and those that are not, and make reference to the associated repair documentation.

"No modification, alteration or addition to or removal from the Aircraft expected to cost over U.S. Dollar threshold (e.g. US \$250,000) or deviation from the Aircraft's original type design or configuration will be made without the prior written consent of lessor, which consent will not be unreasonably withheld or delayed.

All Modifications incorporated on the Aircraft will be properly documented in the Aircraft Documentation and be accomplished in accordance with:

- *EASA-approved data supported by EASA-approved Repair Design Approval Sheets or its EASA equivalent or an EASA-approved*
- *FAA-approved data supported by an FAA Form 8110-3, FAA Form 8100-9 or FAA supplemental type certificate.*

Notwithstanding any other provision of this Lease, no Modification will be made which has the effect of decreasing the utility or value of the Aircraft or invalidating any warranty applicable to the Aircraft."

Redelivery Considerations in Aircraft Operating Leases

- I. Strip & Paint Condition – In most cases the aircraft should be properly stripped or rubbed-down (depending on condition) and painted all white or in a livery designated by lessor.

"All special markings of shall be removed from the aircraft, which shall then be stripped back to primer and repainted all white or in such reasonable external livery as Lessor may specify (with control surfaces balanced if required by the Aircraft Maintenance Manual) and other procedures performed in accordance with the Airframe manufacturer's maintenance procedures, all at the cost of lessee provided that, if the new livery is more complex than lessee's livery at delivery, lessor will reimburse lessee for the incremental cost of painting such new livery."

- J. Acceptance Flight Condition – An acceptance flight using either the lessee's own test flight procedures or procedures supplied by the aircraft manufacturer should be addressed.

"Lessee shall perform a redelivery acceptance flight of the Aircraft with Lessor's representatives on board, using the Airframe Manufacturer's recommended acceptance flight procedures, or such other procedures acceptable to Lessor and Lessee. Lessee shall correct such discrepancy and be responsible for all expenses associated with such flight and shall furnish the necessary permits, crews and fuel.

Upon request of Lessor, Lessee shall permit representatives of the next subsequent lessee or purchaser of the Aircraft to be on board during such redelivery acceptance flight as observers. To the extent any such discrepancy exceeds or is outside of the Airframe Manufacturer's maintenance manual allowable limits."

- K. Execution of Return Acceptance Certificate - Only if the aircraft complies with the requirements of the appropriate authority can the aircraft be accepted for redelivery.

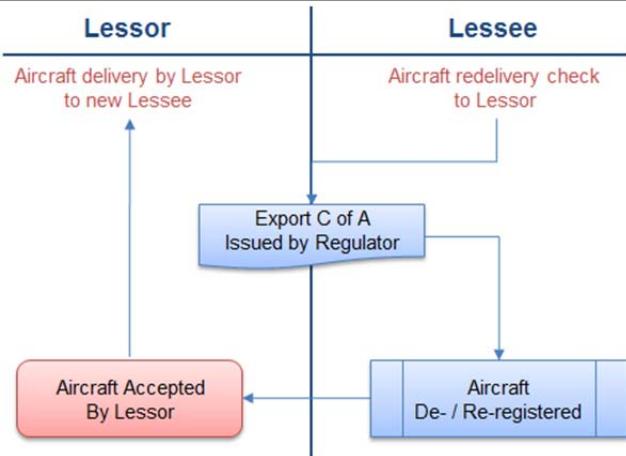
"Upon return of the Aircraft in accordance with the terms of this lease, lessee will prepare and execute a Return Acceptance Certificate and Lessor will countersign and return one such Return Acceptance Certificate to Lessee."

Redelivery Considerations in Aircraft Operating Leases

2.2.2 Certification of Airworthiness Matters

Subject to satisfactory outcome following a redelivery check, documentation audit, and physical inspection, the regulatory authority will provide the aircraft with a new Certificate of Airworthiness (CoA)¹. From the lessor's perspective this is critical, in that failure on the part of the regulatory authority to issue the CoA implies that the lessor cannot pass the aircraft onto a subsequent lessee for the simple reason that it would be illegal for the operator to fly the aircraft.

FIGURE 5- COA REDELIVERY PROCESS



Where cross-border transfers take into account passing an aircraft from one Aviation Authority to another lessor will require that lessee redeliver the aircraft with an Export Certificate of Airworthiness issued by the Aviation Authority. Lessor should clearly understand what the regulatory requirements are for the airplane to transition to the new operating environment, including air traffic control (for example Eurocontrol). Once the above activities are complete the aircraft may be de-registered and re-registered with the objective of either returning the aircraft to the lessor or transferring the aircraft to a new lessee. Figure 5 illustrates the redelivery process for obtaining an Export Certificate of Airworthiness.

Example contract wording:

"The Aircraft shall:

- i. have been deregistered from all relevant aircraft registries and notice of deregistration by the Aviation Authority shall have been sent to an aviation authority designated by Lessor
- ii. be in a condition suitable for issuance of an EASA or FAA Standard Certificate of Airworthiness for transport category aircraft and commercial passenger operations
- iii. have a valid certificate of airworthiness for export issued by the Aviation Authority, provided the accomplishment of such modifications will not result in a delay in the redelivery of the aircraft to Lessor. In the event such modifications to the Aircraft are required by Lessor, and such modifications are not a requirement of this Lease, Lessor shall reimburse for the accomplishment of such modifications."

¹ Within EASA there is no requirement to renew the Certificate of Airworthiness every year, instead an ARC (Airworthiness Review Certificate) is issued.

Redelivery Considerations in Aircraft Operating Leases

2.2.3 Redelivery Checks & Part Lives

Lease agreements specify absolute minimum conditions to assure that a follow-on lessee will be capable of flying an aircraft without major maintenance for a period of time generally consistent with a C-Check interval (although today many maintenance programs for modern aircraft types no longer define C-Checks). Figure 6 below highlights the major maintenance events requiring minimum clearance intervals along with the source(s) used to define the redelivery clearance intervals.

FIGURE 6- MAJOR MAINTENANCE ITEMS AND ASSOCIATED CLEARANCE INTERVAL SOURCES

Equipment	Maintenance Event	Source of Redelivery Clearance Intervals
Airframe	Heavy Check (i.e. C-Check, Structural Check)	MPD / Approved Maintenance Program
Landing Gear	Overhaul	MPD
Engine Modules	Performance Restoration	Hard-time or Remaining Life based on assumed Mean-Time Between Performance Restoration (MTBPR)
Engine LLPs	Replacement	Engine Manual / Airworthiness Directive
APU	Overhaul	Hard-time, Remaining Life based on assumed Mean-Time Between Removals (MTBR), or serviceable as-is where-is
Hard-time Components	Overhaul	MPD / Approved Maintenance Program

In most leases, the lessee is required to redelivery the asset at the end of the lease in a condition that usually “mirrors” the delivery requirements of a follow-on lessee – Figure 7. The general rule is that lessor's will specify minimum redelivery conditions below which lessee is obliged to perform maintenance before returning the aircraft, and lessor will specify minimum delivery conditions below which lessor is obliged to perform maintenance before delivering the aircraft. The following section discusses minimum conditions for each of the maintenance items highlighted above.

FIGURE 7- AIRCRAFT MIRROR-IN / MIRROR-OUT REDELIVERY PHILOSOPHY

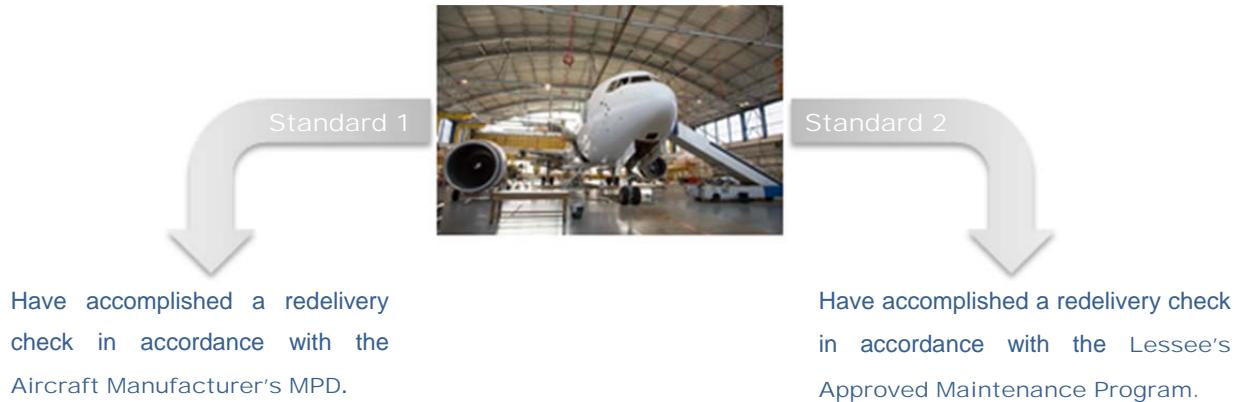


Redelivery conditions usually “mirrors” Delivery requirements with major maintenance events cleared for pre-defined intervals consistent with a standard C-Check interval (e.g. 24 MO / 6,000 FH / 4,500 FC)

Redelivery Considerations in Aircraft Operating Leases

Airframe – As illustrated in Figure 8, the condition of the airframe at return can be structured in accordance with two standards consisting of: a.) a requirement to perform the redelivery check in accordance with the manufacturer's Maintenance Planning Document (MPD) or b.) A requirement to perform the check in accordance with the lessee's approved maintenance program. Both options are further discussed below.

FIGURE 8- AIRFRAME REDELIVERY CONDITION OPTIONS



Standard 1 simplifies the redelivery transition given the tasks are in phase with the manufacturer's recommended intervals. This option also makes it easier to bridge the aircraft to a follow-on lessee's maintenance program in the event it deviates from the OEM's MPD.

Example contract wording:

"The Airframe shall be returned to Lessor fresh out of the Redelivery Check such that the Aircraft is clear of all tasks and other items for not less than 24 months, 6,000 Flight Hours and 4,500 Cycles, all in full accordance with the MPD. Lessee must remove the Aircraft from any customized maintenance program and reintegrate the Aircraft back into the latest version of the MPD by carrying out any required block check/s required at that time."

Standard 2 simplifies the return of the aircraft from the lessee's perspective given it precludes the performance of any additional work required to align (bridge) the maintenance program with that of the new operator. The lessor however, may be required to either fully cover or share in the expense to bridge the airframe to the new lessee's maintenance program.

Example contract wording:

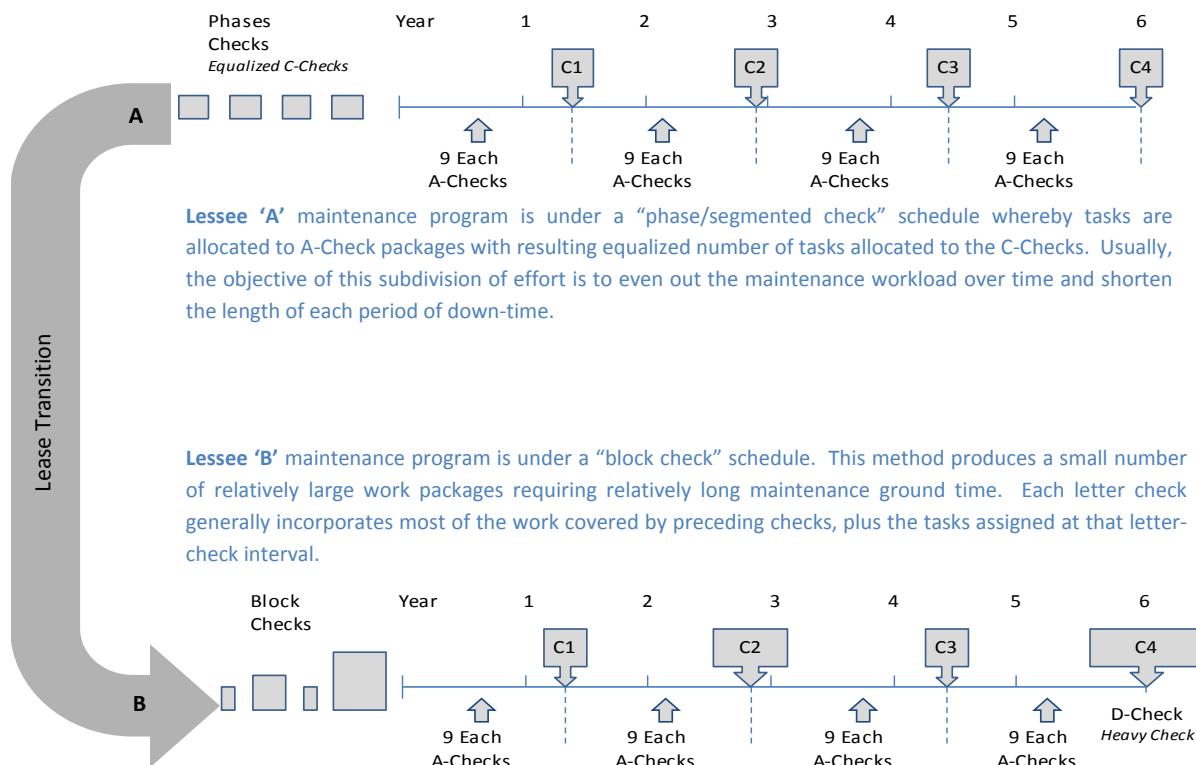
The Airframe shall be returned to Lessor fresh out of a Redelivery Check such that the Aircraft is clear of all checks and other items required in accordance with the lessee's Approved Maintenance Program for a period not less than 24 months, 6,000 Flight Hours and 4,500 Cycles

Redelivery Considerations in Aircraft Operating Leases

Bridging of Maintenance Programs Perspective

Bridging of maintenance programs allows an operator to account for all scheduled maintenance requirements for transition from one maintenance program to another. Building a bridging maintenance program depends upon certain information such as the airplanes past and future utilization (FH/day and FH/cycle), whether the current program is a blocked/phased program, and the content of the old and new programs. Consider the following items while building a bridging maintenance program.

- A. Where is the airplane in terms of the maintenance cycle? Express this in terms of the tasks that have been accomplished, and what the airplane flight hours, cycles and date was at the time each task was accomplished. The tasks still to be accomplished also need to be identified with the amount of flight hours/cycles/time remaining until each task is due.
- B. Define and understand the next scheduled maintenance program based upon a given utilization and the availability of the airplane for maintenance visits.
- C. Identify any tasks in the existing or new scheduled maintenance program that are unique to the airline's operation (i.e. not in the MPD) and are not mandatory in one program but mandated in the other program.
- D. To simplify bridging, the operator shall retain all MPD task numbers or provide a cross-reference correlation between the operator's numbering system and the MPD task number should be created.



Redelivery Considerations in Aircraft Operating Leases

Engines – As illustrated in Figure 9, the condition of the engines at return can be structured in accordance with two standards consisting of: a.) requiring a specified minimum number of flight hours and cycles remaining before it undergoes its next shop visit, or b.) establishing a ‘hard-time’ limit whereby the engine may not have more than a certain amount of flight hours cycles since last shop visit. Both options are further discussed below.

FIGURE 9- ENGINE REDELIVERY CONDITION OPTIONS



Standard 1 can be validated through the use of trend-monitoring analysis, which is a reliable tool for assessing the overall health of the engine and for predicting remaining time on-wing; today, most airlines employ the use of Engine Conditioning Monitoring Programs (ECMP) to track and trend-monitor their engines. Interpreting trend-monitoring data however, can be subjective particularly when the data indicates abnormal or rapid deterioration in the performance of an engine.

Example contract wording:

Each Engine shall have sufficient EGTm and a minimum of 4,500 FC remaining on the Limiter of each engine as well as trend data indicating that the engine will, at full thrust rating, be able to operate a minimum of 24 months, 6,000 flight hours and 4,500 cycle until the next Engine Performance Restoration Shop Visit based on Manufacturer's data and trend monitoring data."

Engine Redelivery Condition Perspective

Engine maintenance status is determined by assessing the condition of its constituent modules and by estimating the remaining lives of life limited parts (LLPs). The health of engine modules can be assessed by analyzing several factors such as “oil consumption, exhaust gas temperature (EGT) margin, borescope inspection and performance data. Lessors usually need to have a short-haul engine condition with at least 3,000-5,000 EFC remaining on-wing time for the engine to be marketable, and at least 1,000 – 3,000 EFC remaining on medium-to-long-haul engines.



Redelivery Considerations in Aircraft Operating Leases

Standard 2 establishes intervals “since” last engine shop visit, which is more practical to administer given that returning engines with hard-time minimums can be easily managed. A concern to the lessor however, is if the subsequent lessee insists on accepting the engines with minimum time on-wing remaining. In this scenario it’s possible that trend monitoring analysis demonstrates that the engines cannot achieve contractual minimums.

Example contract wording:

“Each engine shall be serviceable and shall have accumulated not more than 6,000 Flight Hours and 3,000 Flight Cycles since last performance restoration”

“Each Engine Life Limited Part shall have at least 3,000 Flight Cycles remaining until its next scheduled removal and replacement”

Auxiliary Power Unit (APU) - The APU is a gas turbine generator that provides auxiliary electrical and pneumatic power to the aircraft. Today's APU have a modular construction for ease of maintenance. The main modules consist of the load compressor, power section and gearbox. At redelivery consideration should be given to have the APU meet: a.) Serviceable standards or b.) A hard-time standard whereby the APU is returned having a minimum amount of time since last shop visit.

Example contract wording:

“The APU shall be in serviceable condition with no discrepancies that exceed maintenance manual allowable limits”, or

“The APU shall be serviceable and shall have accumulated not more than 2,000 APU Hours since last overhaul or heavy repair, whichever is applicable”

Engine Condition Monitoring Perspective

Under **condition-monitoring** no services or inspections are scheduled on an engine to determine integrity or serviceability, instead the performance is monitored and analyzed. For example, a given operating characteristic of the engine (e.g. EGT Margin) is trended and compared with known “normal” operating levels.

An acceptable range is established with either upper and/or lower limits. As long as the trend data remain inside the acceptable level, any variation is considered to be normal. When the trend line intersects the “unacceptable” limit, removal of the engine is required to prevent a failure in the future.



Redelivery Considerations in Aircraft Operating Leases

Landing Gear - A landing-gear ship-set consist of a nose gear leg plus two to four main gear legs, depending on aircraft type. Landing gear overhaul intervals are defined in the MPD for each aircraft type and are generally calendar & flight cycle limited; in the region of 10-12 years and 18,000-20,000 flight cycles for most models. The life limits on most landing gear LLPs is on the order of 50,000FC - 75,000FC, which implies they are rarely replaced. In addition to defining the clearance minimums for the landing gear it is also suggested to state the condition of the brakes and tires at redelivery.

Example contract wording:

"Each Landing Gear shall have no less than 24 months or 2,000 FC (whichever is more limiting) remaining until its next scheduled overhaul.

The Landing Gear brakes and tires will each have an average of at least fifty percent (50%) service life remaining before their removal with no individual brake or tire having less than twenty five percent (25%) service life remaining."

Hard-Time Components - The aircraft manufacturer identifies certain components that require a specific maintenance action at specified time intervals (hours, cycles or calendar time, as appropriate). Examples of hard-time components consist of escape slides, portable fire & oxygen bottles, first-aid kits, and life jackets. At redelivery, lessor should validate the status of hard-time components against remaining life requirements defined in the lease agreement.

Example contract wording:

"All hard time components shall have remaining to the next limiting factor for maintenance at least: (i) for items the subject of an hour limit, 6,000 Flight Hours; (ii) for items the subject of a cycle limit, 4,500 Cycles; or (iii) for items the subject of a calendar limit, 24 months interval. In the event that such hard time components have an interval of less than 6,000 Flight Hours, 4,500 Cycles or 24 month interval (as the case may be), they shall have 100% of life remaining."

Redelivery Considerations in Aircraft Operating Leases

2.2.3 Aircraft Documentation Standards & Records

A well-kept set of maintenance records that properly identifies all previously performed maintenance, alterations, and AD compliances is generally a good indicator of the aircraft's maintenance status. On the other hand, poor upkeep of aircraft records can have particularly negative consequences for aircraft. A lack of correct records will make tracing components, along with their maintenance status, more difficult. Appendix A details the list of documents that commonly need transfer with the aircraft at redelivery.

Documentation Standards

The list below describes methods, procedures and best practices that have been determined to be acceptable means of showing compliance with record keeping standards.

- i. In the English language;
- ii. Clear and legible, and corrections must show the corrected original entry
- iii. In accordance with best airline practice and in a format which complies with the generally accepted practice in the international commercial airline standards;
- iv. So as to comply with the requirements of the FAA or EASA, and the Aviation Authority
- v. Up to date to reflect the operation and the current configuration of the aircraft including all maintenance, repair and work performed and all "approved data" and "accepted data".
- vi. Kept in a manner that prevents damage, alteration, loss or theft.
- vii. If kept in digital form, then:
 - At least one complete backup copy of all records must be stored in a different location, and in an environment that prevents damage, alteration, loss or theft. Backup must be made within 24 hours of the performance of the underlying maintenance
 - Each computer terminal where the records may be accessed must have program safeguards against records alteration by unauthorized personnel.

Maintenance Records Retention Perspective - FAA and EASA Regulations

When aircraft are transferred from one owner or operator to another, all required records must follow the aircraft, and the new owner or operator must have a recordkeeping system that maintains records for the following periods:

- All maintenance records for the aircraft and any life limited parts must be kept until underlying work is superseded, but not less than 36 months
- Total time in service for life limited parts for at least 12 months after the aircraft or component has been withdrawn from service.
- Current status of compliance with maintenance program until underlying work is superseded
- Current status of AD compliance for at least 12 months after the aircraft or component has been withdrawn from service
- Details of Mods & Repairs for at least 12 months after the aircraft, engine, or component has been withdrawn from service

Redelivery Considerations in Aircraft Operating Leases

APPENDIX A - AIRCRAFT DOCUMENTATION LIST

At redelivery, a defined number of documents and associated records are required. This Appendix summarizes the recommended standards for maintaining these documents and provides a description of what is generally required. Lease agreements and associated redelivery requirements will often be different, and consequently the list of documentation will be different, as items can be added and/or removed from this list.

A. STATUS LIST

Item	Description	Comments
1	Certified Current Time in Service	Certified report showing the TSN (Time Since New – i.e. total Flight Hours since new manufacture) and CSN (Cycles Since New – i.e. total Cycles since new manufacture) for Airframe, Engines, APU and Landing Gear.
2	Certified Airworthiness Directive Status	A certified list of all the ADs generally applicable to the Aircraft/Engine type showing for each AD, method of compliance, interval, last done, next due (TSN, CSN, Date). The status should be broken down by individual task of the AD. If not applicable, then must show reason why. A separate status is preferable for each of the Airframe, Engines, and Appliances
3	Certified Service Bulletin Status	A certified list of all Manufacturer's Service Bulletins issued for the Aircraft/Engine type showing for each Service Bulletin, whether or not incorporated, intervals, last accomplished, next due (TSN, CSN, Date), as applicable to the Service Bulletin type. A separate status is preferable for each of the Airframe, Engines, and APU
4	Certified Modification Status	A certified summary of all modifications accomplished on the Aircraft/Engine which are not accomplished in accordance with a service bulletin issued by the Manufacturer. A separate status is preferable for each of the Airframe, Engines, and APU.
5	Certified STC Modification Status	A certified summary of all modifications accomplished on the Aircraft/Engines which are accomplished in accordance with an STC (Supplemental Type Certificate).
6	Certified Engine Life Limited Parts Status	A certified list for each engine showing all the LLPs incorporated in the engine by P/N (Part Number) and S/N (Serial Number), showing the Life Limit of the part, the Hours and Cycles accumulated and the Hours and Cycles remaining at each Thrust Setting.

Redelivery Considerations in Aircraft Operating Leases

A. STATUS LIST - continued

Item	Description	Comments
7	Certified Landing Gear Life Limited Parts Status	A certified list for each Landing Gear assembly showing all the LLPs incorporated in the assembly by P/N and S/N, showing the Life Limit for the part to which it can be fitted, the Flight Hours and Cycles accumulated on each part, and the Flight Hours and Cycles remaining for each part.
8	Certified APU Life Limited Parts Status	A certified list for the APU showing all the LLPs incorporated in the APU by P/N and S/N, showing the Life Limit of the part, the APU Hours and Cycles accumulated, and the APU Hours and Cycles remaining.
9	Certified Hard Time Part Status	A certified list of the Hard Time Parts which require replacement or off aircraft maintenance at time intervals specified in the MPD (at the end of the lease) or Maintenance Program (during the lease). The list should show by P/N and S/N the Hard Time Event maintenance required, the hard time limit (Flight Hours, Cycles or Calendar Time, as appropriate), last done, next due (TSN, CSN, Date).
10	Certified Repair Status	A certified list of all repairs accomplished on the Aircraft, showing for each repair, the location, the nature of the defect, the repair accomplished, the date accomplished, and the TSN and CSN of the Aircraft at accomplishment. Each repair item should have an item number and this item number
11	Certified Loose Equipment List	A certified list of installed loose equipment, or special tools to be provided with the Aircraft at Return and their location on the aircraft e.g. galley equipment, emergency equipment, headsets, landing gear pins, covers, etc.
12	Certified Fitted Listing	A certified list of all serialized Parts fitted to the Aircraft. The list should show by P/N and S/N the time since installation (Flight Hours, Cycles, and Days). Ideally, the list should also show the time since new (Flight Hours, Cycles, Days) and the time since shop visit (Flight Hours, Cycles, Days).
13	Certified ALI Status	Where applicable, a certified list of all the ALI (Airworthiness Limitation Item) task cards showing for each task card, Threshold, Interval, type of inspection accomplished, last done, next due (TSN, CSN, Date).
14	Certified CMR Status	Where applicable, a certified list of all the CMR (Certification Maintenance Requirement) task cards showing for each task card, Interval, last done, next due (TSN, CSN, Date).

Redelivery Considerations in Aircraft Operating Leases

B. CERTIFICATES

Item	Description	Comments
1	Certificate of Airworthiness	Current Certificate of Airworthiness as provided by the Airworthiness Authority (National Airworthiness Authority) of the country of registration.
2	Certificate of Registration	Certificate of Registration as provided by the Airworthiness Authority of the country of registration.
3	Export Certificate of Airworthiness	Current Export Certificate of Airworthiness as provided by the Airworthiness Authority of the country of registration at Lease Expiry.
4	Noise Limitation Certificate	Noise Limitation Certificate as provided by the Airworthiness Authority of the country of registration.
5	Radio Station License Certificate	Radio Station License as provided by the Airworthiness Authority or radio licensing authority of the country of registration.
6	Air Operator Certificate	Current AOC (Air Operator Certificate) as issued by the Airworthiness Authority of the State of the Operator.

C. STATEMENTS

Item	Description	Comments
1	Major Modification Statement	A certified statement identifying any major modifications incorporated on the Aircraft.
2	Major Repair Statement	A certified statement identifying any major repairs incorporated on the Aircraft.
3	Accident/Incident Statement	A certified statement from the Lessee identifying the serial number of the Aircraft and the serial number of its installed engines confirming that they have not been involved in any accident or incident while in the possession of the Lessee. OR In the event that the Aircraft and/or engines have been involved in an accident or incident, then a summary of the accident/incident should be inserted with reference details of the Return to Service workscope accomplished after the accident/incident.

Redelivery Considerations in Aircraft Operating Leases

D. RECORDS

Item	Description	Comments
1	Airframe Log Book	Log of airframe Flight Hours and Cycles, Maintenance Checks, Modifications, AD's, etc.
2	Engine Log Books	Log of engine Flight Hours and Cycles, Shop Visits, Modifications, AD's, Airframes to which fitted (Serial Numbers or Registrations), Installation data (Date, TSN, CSN), Removal data (Date, TSN, CSN), Thrust Ratings, etc.
3	APU Log Books	Log of APU Hours, Shop Visits, Modifications, AD's, Airframes to which fitted, fitted (Serial Numbers or Registrations), Installation data (Date, TSN, CSN), Removal data (Date, TSN, CSN), etc.
4	Airframe Checks	Work package for maintenance accomplished in compliance with the Maintenance Program. At the very minimum it should include Task Cards from last "C" and Heavy Structural Inspection, or equivalents.
5	Engine Shop Visit Records	Shop visit reports for all Engine/Module shop visits, to include: Release to Service Certificate / AD Status / Service Bulletin Status / LLP Status / Engine Configuration Status / Incoming Inspection Report / Outgoing Summary Report of Work Accomplished / Test Cell Report
6	Engine Condition Monitoring Report	A copy of the most recent trend report for each engine.
7	Last Engine Borescope Report & Video	Typically, the borescope accomplished as part of the Return Conditions.
8	APU Shop Visit Records	Shop visit reports for all APU shop visits, to include: Release to Service Certificate / AD Status / Service Bulletin Status / LLP Status / Test Cell Report
9	Last APU Borescope Report & Video	Typically, the borescope accomplished as part of the Return Conditions.

Redelivery Considerations in Aircraft Operating Leases

D. RECORDS - continued

Item	Description	Comments
10	AD Records	Dirty Finger Print records. Originally certified record, as recorded by an aircraft technician of the most recent accomplishment of each task for each AD requirement that would have fallen due since manufacture. Ideally the AD records should be presented in a binder containing a copy of each AD generally applicable to the Aircraft/Engine type. Behind each AD in the binder should be the record of last accomplishment of each requirement of the AD (dirty finger print record), or, if the AD is not applicable to the specific Aircraft/Engine, then evidence of this non-applicability should be inserted.
11	Modification Records	Certified records showing the accomplishment of each modification to the Aircraft since delivery from the Manufacturer. Modifications which are not 100% based on a Service Bulletin issued by the Manufacturer must show evidence of approval of the modification data from the State of Design of the Aircraft and approval from the Aviation Authority of the State of Registration. Major modifications must have an FAA Form 337 or EASA/JAA equivalent approving the actual accomplishment.
12	Landing Gear Records	Release to Service Certificate (FAA 8130-3 or EASA Form 1) from new or last maintenance activity for each serialized part of the assembly, and Release to Service Certificate for last overhaul for each serialized part of the assembly and release to service record for installation on the Aircraft. Parts installed on the Aircraft since the Aircraft was new, and which have never been removed from the Aircraft, may be evidenced by the Fitted Listing provided at manufacture by the Aircraft Manufacturer.
13	Hard Time Part Records	Release to Service Certificate (FAA 8130-3 or EASA Form 1) from new or last maintenance activity, and Release to Service Certificate for last accomplishment of the specified Hard Time Event maintenance and release to service record for installation on the Aircraft. Parts installed on the Aircraft/Engine since the Aircraft/Engine was new, and which have never been removed from the Aircraft/Engine, may be evidenced by the Fitted Listing provided at manufacture by the Aircraft/Engine Manufacturer (e.g. Boeing – Aircraft Readiness Log, Airbus – Aircraft Inspection Report, CFMI – Engine Data Submittals, and IAE – Vital Statistics Log).

Redelivery Considerations in Aircraft Operating Leases

D. RECORDS - continued

Item	Description	Comments
14	On-Condition & Condition-Monitored Part Records	Release to Service Certificate (FAA 8130-3 or EASA Form 1) from new or last maintenance activity if mandated by local regulatory authorities, and release to service record for installation on the Aircraft. An alternative for demonstrating airworthiness is for the operator to provide a controlled list of OC/CM parts with operator QA sign-off. Parts installed on the Aircraft/Engine since the Aircraft/Engine was new, and which have never been removed from the Aircraft/Engine, may be evidenced by the Fitted Listing provided at manufacture by the Aircraft/Engine Manufacturer (e.g. Boeing - Aircraft Readiness Log, Airbus – Aircraft Inspection Report, CFMI - Engine Data Submittals, and IAE – Vital Statistics Log).
15	Repair Records	Certified records showing accomplishment of repairs to the Aircraft since delivery from the Manufacturer. Repairs not accomplished in accordance with the Manufacturer's SRM must show evidence of approval of the repair data from the Compliance Authority (e.g. FAA Form 8110-3 for Aircraft designed in the United States) and approval from the Airworthiness Authority of the State of Registration. Major repairs must have an FAA Form 337 or EASA/JAA equivalent approving the actual accomplishment.
16	Last Weighing Report	Certified copy of the last weighing report accomplished for the Aircraft.
17	Compass Swing Report	If required, Certified accomplishment and recordings of the last compass swing
18	Burn Test Certificates	Certification of compliance with Fire Blocking requirements of EASA CS-25 or FAR 25. Certificates required for: Seat Bottom Foam / Seat Back Foam / Seat Dress Fabric / Seat Bottom Cushion Assembly / Seat Back Cushion Assembly / Curtains / Carpets / Galley Flooring
19	Last Test Flight Report	Typically, the report for the test flight accomplished as part of the Return Conditions.
20	Fuel Sample Records	Records confirming that the fuel in each tank has been sampled and tested at Return and confirming that no contamination has been found.

Redelivery Considerations in Aircraft Operating Leases

E. DRAWINGS

Item	Description	Comments
1	LOPA	Passenger seating configuration drawing approved by the Compliance Authority and the Airworthiness Authority of the State of Registration.
2	Emergency Equipment Layout	A layout drawing showing the location of the installed emergency equipment required to comply with the operational regulations of the State of the Operator, approved by the Airworthiness Authority of the State of the Operator and the Airworthiness Authority of the State of Registration.
3	Galley Drawings	Galley Manufacturer's drawings of the galley installation and openings

F. MANUALS

Item	Description	Comments
1	Flight Manual	Latest Revision
2	Flight Crew Operating Manual	Latest Revision
3	Quick Reference Handbook	Latest Revision
4	Master Minimum Equipment List	Latest Revision
5	Weight and Balance Loading Manual	Latest Revision
6	Aircraft Maintenance Manual (AMM)	Latest Revision
7	Illustrated Parts Catalog	Latest Revision

Redelivery Considerations in Aircraft Operating Leases

F. MANUALS - continued

Item	Description	Comments
8	Wiring Diagram Manual	Latest Revision
9	Aircraft Schematic Manual	Latest Revision
10	Electrical Load Analysis	Latest Revision
11	Passenger Seat Component Maintenance Manual	Latest Revision
12	Galley Manuals	Latest Revision
13	IFE Operations Manual	If applicable - Manual showing operation of In Flight Entertainment system.
14	Maintenance Program	Latest Approved Revision

Redelivery Considerations in Aircraft Operating Leases

APPENDIX B – EXAMPLE PHYSICAL INSPECTION REPORT

Exterior Condition	Poor	Avg	Fair	Good	Excellent	Comments
Paint	_____	_____	_____	_____	_____	_____
Forward Fuselage	_____	_____	_____	_____	_____	_____
Mid Fuselage	_____	_____	_____	_____	_____	_____
Aft Fuselage	_____	_____	_____	_____	_____	_____
Belly Skins	_____	_____	_____	_____	_____	_____
E & E Compartment	_____	_____	_____	_____	_____	_____
Upper Wing	_____	_____	_____	_____	_____	_____
Lower Wing	_____	_____	_____	_____	_____	_____
Flaps	_____	_____	_____	_____	_____	_____
Ailerons	_____	_____	_____	_____	_____	_____
Horizontal Stabilizer	_____	_____	_____	_____	_____	_____
Vertical Stabilizer	_____	_____	_____	_____	_____	_____
Wheel Wells	_____	_____	_____	_____	_____	_____
Landing Gear	_____	_____	_____	_____	_____	_____
Wheels & Tires	_____	_____	_____	_____	_____	_____
Engine Nacelles	_____	_____	_____	_____	_____	_____
Thrust Reversers	_____	_____	_____	_____	_____	_____
Pylons	_____	_____	_____	_____	_____	_____
Doors	_____	_____	_____	_____	_____	_____
Cargo Compartment	_____	_____	_____	_____	_____	_____
 Interior Condition						
Passenger Seats	_____	_____	_____	_____	_____	_____
Lavatories	_____	_____	_____	_____	_____	_____
Galleys	_____	_____	_____	_____	_____	_____
Flight Attd. Stations	_____	_____	_____	_____	_____	_____
Windows	_____	_____	_____	_____	_____	_____
Overhead Bins	_____	_____	_____	_____	_____	_____
Ceilings	_____	_____	_____	_____	_____	_____
Sidewalls	_____	_____	_____	_____	_____	_____
Floor / Carpets	_____	_____	_____	_____	_____	_____
 Cockpit Condition						
Seats	_____	_____	_____	_____	_____	_____
Instruments / Equip	_____	_____	_____	_____	_____	_____
Windows	_____	_____	_____	_____	_____	_____

Redelivery Considerations in Aircraft Operating Leases

APPENDIX C – APPROVED VERSUS ACCEPTABLE REPAIR DATA

Under the United States Federal Aviation Administration (FAA) system, repair data can be classified as either “acceptable” or “approved.” In European Aviation Safety Agency (EA SA) regulations, all repair data shall be “approved.”

Under FAA jurisdiction airplane repairs can be classified as either “major” or “minor.” The responsibility for determining whether a repair is major or minor rests with operators, repair stations, and holders of an inspection or maintenance authorization. In the U.S., all operators have authority to use acceptable repair data for minor repairs without additional FAA approval. Operators have many ways to obtain FAA - approved repair data:

- Accomplish the repair per the Boeing structural repair manual (SRM) because all repairs in the Boeing SRM are FAA approved.
- Apply to the FAA directly.
- Use a DER, who has a “special delegation” from the FAA, to approve data for major repairs using an FAA form 8110-3.
- Where FAA authorization has been delegated to Boeing, a Boeing AR may approve the engineering repair data on an FAA form 8100-9.

EASA regulations require “approved” data for both minor and major classifications of airplane repairs. This policy is in contrast to the FAA system that requires “approved” data for major repairs only and “acceptable” data for minor repairs. Additionally, EU operators under EASA regulations cannot make determinations of minor or major for repairs unless they hold an EASA design organization approval (DOA).

EU operators without an EASA DOA must rely on EASA directly or contract with an EASA-authorized DOA holder to have the repair classified. There are different levels of EASA DOA authorization. For example, Basic DOA allows the holder to classify major or minor repairs and approve minor repairs only. A TC /STC holder with an EASA DOA can also approve both major and minor repairs.

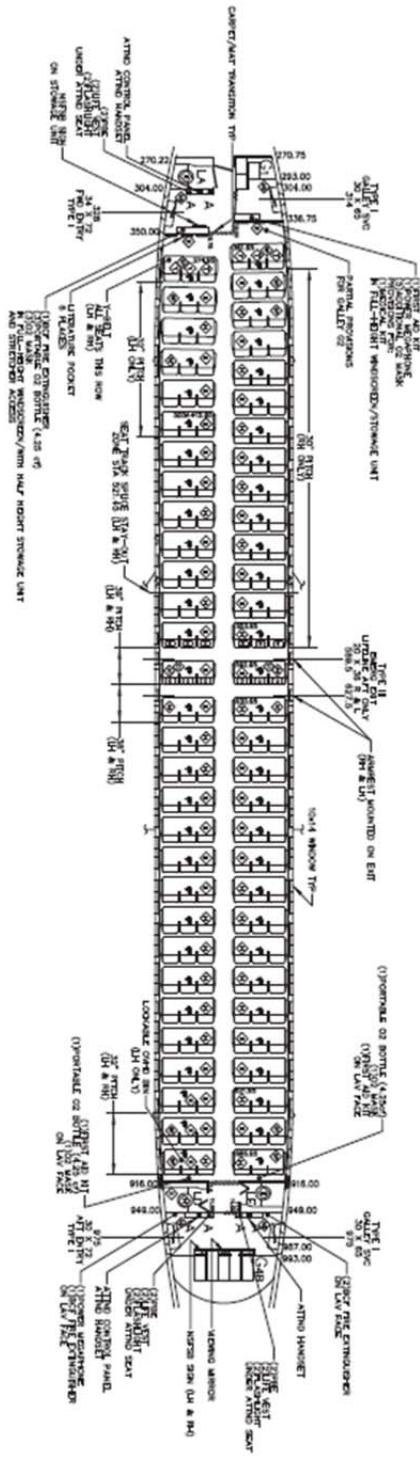
Redelivery Considerations in Aircraft Operating Leases

FAA VERSUS EASA - MAJOR AND MINOR REPAIR OVERVIEW

	FAA Definition	EASA Definition	FAA Repair Data	EASA Repair Data
Major Repair	Major repairs are those that if improperly done, might appreciably affect weight, balance, structural strength, performance, power-plant operation, flight characteristics, or other qualities affecting airworthiness or that; are not done according to accepted practices or elementary operations.	All other repairs that are not minor.	Approved data from the FAA or FAA designee — designated engineering representative (DER) or authorized representative (AR)	Approved by EASA or EASA design organization approval (DOA)
Minor Repair	Minor repair is any repair, other than a major repair.	A minor repair is one that has no appreciative effect on the mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emissions, or other characteristics affecting the airworthiness of the airplane.	Acceptable data from the operator or type certificate (TC) / supplemental type certificate (STC) holder	<p>Approved data by EASA or EASA DOA ; or acceptable data from the TC /STC holder or third party*</p> <p>*Acceptable data developed under the FAA system for a minor repair will be automatically approved by EASA under the pending U.S.-EU Bilateral Aviation Safety Agreement.</p>

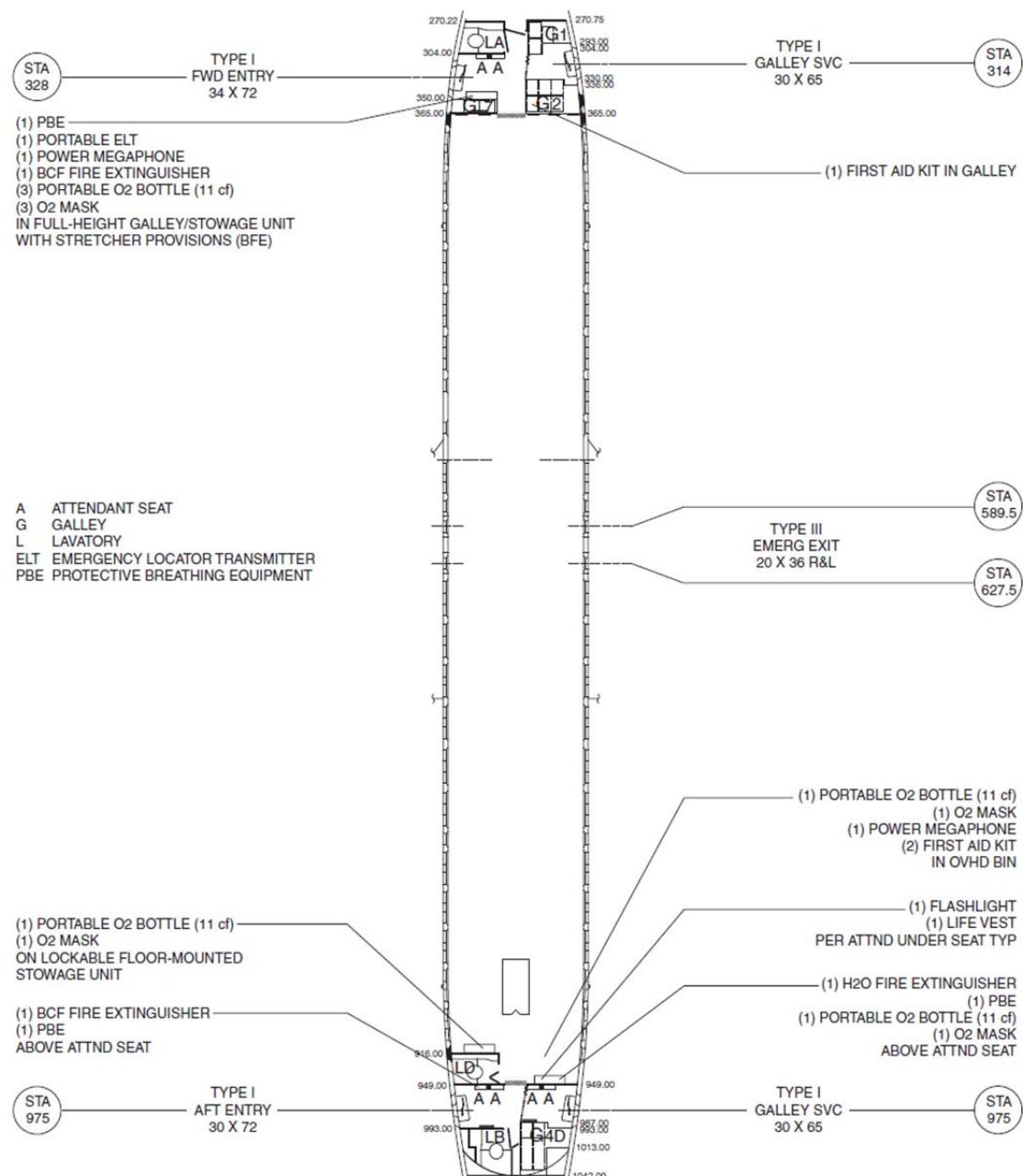
Redelivery Considerations in Aircraft Operating Leases

APPENDIX D – EXAMPLE LAYOUT OF PASSENGER ACCOMODATION (LOPA)



Redelivery Considerations in Aircraft Operating Leases

APPENDIX D – EXAMPLE EMERGENCY EQUIPMENT DRAWING



Redelivery Considerations in Aircraft Operating Leases

REFERENCES

1. **IATA - Guidance Material and Best Practices for Aircraft Leases.** 1st Edition , February 1, 2014
2. **IATA - Operating Lease of Aircraft - Guidance on Aircraft Lease Delivery and Return.** September, 2013
3. **Approved Versus Acceptable Repair Data: How to Make Sure You Have What You Need** Boeing Aero Magazine Quarterly, Qtr_03, 2007
4. **Aircraft Technical Records.** Chris Brennan, Airline Fleet Management, April 09, 2013
5. **FAA Advisory Circular – AC No. 43-9C – Maintenance Records,** June 6, 1998
6. **Back-to-Birth Traceability and Life-Limited Parts.** Airline Suppliers Association – The Update Report, Volume 7, Issue 1.
7. **Summary of regulations concerning Aviation Maintenance Records.** AirVault (www.airvault.com)
8. **IBA Maintenance Cost Journal – Aircraft Delivery & Re-delivery.** Issue 34

About the author:



Shannon Ackert is currently Senior Vice President of Commercial Operations at Jackson Square Aviation where he has responsibility of the firm's commercial activities including technical services, contract development & negotiation, and asset selection & valuation. Prior to joining Jackson Square, Shannon spent over ten years working in the aircraft leasing industry where he presided over technical asset management roles as well as identifying and quantifying the expected risk and return of aircraft investments. Shannon started his career in aviation as a flight test engineer for McDonnell Douglas working on the MD-87/88 certification programs, and later worked for United Airlines as systems engineer in the airlines 757/767 engineering organization. He has published numerous industry reports dealing with aircraft maintenance economics and market analysis, and is a frequent guest speaker at aviation conferences. Shannon received his B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University and MBA from the University of San Francisco.