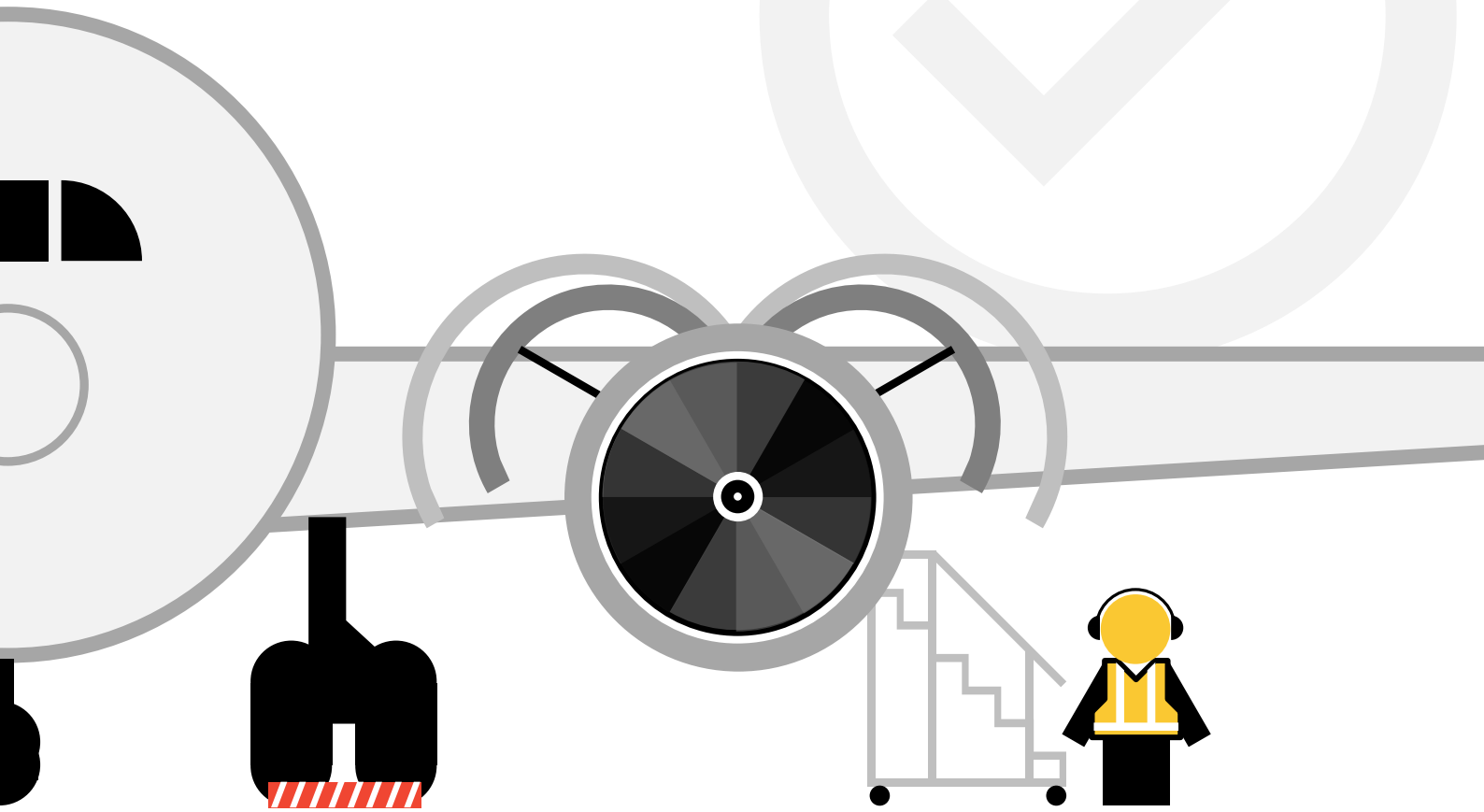
Guidance for Managing Aircraft Airworthiness for Operations During and Post Pandemic

Edition 1-12 June 2020



DISCLAIMER

All IATA Covid19 related guidance materials can be found at
https://www.iata.org/en/programs/covid-19-resources-guidelines/

For feedback, questions or comments, please contact techops@iata.org

Contents

Revision record

Symbol	Meaning
□	Insertion
△	Amendment
⊗	Deletion

Revision table

Revision	Date	Section	Significant changes
Edition 1	12 Jun 202	N/A	New issue

1 Introduction and Scope

This guidance aims to provide a tool for airlines working to ensure the airworthiness of their aircraft fleet and manage the associated safety risks while facing the operational challenges introduced and restrictions caused by the COVID-19 worldwide crisis.

It is recognized that many business decisions regarding the utilization of the aircraft fleet must be made prior to focusing on airworthiness (e.g. aircraft parking vs. retirement, short vs. long term parking/storage, location(s) for grounded aircraft). Those decisions and associated risks are currently out-of-scope for this guidance material.

The present document would be of use to airlines in their actions to secure a controlled safety risk approach in ensuring aircraft airworthiness for:

- the period of drastically reduced and irregular flying activity or complete stoppage of flight operations, during which aircraft are parked (beyond the between-flights normal parking) or stored
- the period of gradual return to / restart of a regular flying activity, during which aircraft are returned to service from their parked or stored condition

Airlines should always refer to the individual aircraft OEM applicable information when deciding on the course of action to follow in implementing any of the elements provided in this guidance. Such implementation actions should be executed only as allowed by and in concordance with the regulatory provisions governing the airline activity.

The scope of this guidance is to highlight the type of considerations which the airlines should factor in when pursuing technical operations with aircraft airworthiness relevance while also assuring asset value for owners / lessors of the aircraft and its components.

While this guidance was developed in the context of COVID-19 impact on the airline industry, its content would be transferable to any similarly consequential disruption of aircraft operations.

This guidance will be updated as required when additional relevant information becomes available.

2 Objective

The purpose of this guidance is to provide the operators with practical elements, rationale and suggested template to maintain an acceptable level of safety at all times when assuring aircraft airworthiness during the operational crisis.

This document provides information on the considerations for a safety risk assessment and formulates recommendations on mitigations to such risks associated with extended grounding of aircraft and subsequent restart of operations.

3 Aircraft parking and storage procedures

3.1 General context

The significant drop in airline operational activity led to the grounding of approximately 65% of the global airline fleet (at end of April 2020) and with an estimated (at this time) yearly decline of RPKs in 2020 by around 40% in domestic travel and by around 60% in international travel.

Ensuring aircraft airworthiness is an essential element to the safety of airline operations and the challenges of preserving the continuity of aircraft airworthiness in the conditions of a massive and prolonged inactivity of the global fleet are numerous.

The aviation industry infrastructure is not optimized to accommodate a simultaneous grounding of the majority of the fleet and airlines ended numerous operations with temporary or extended parking of aircraft outside of their normal hub locations, serviced network stations or maintenance facilities they customarily use.

While there are always technical challenges to be addressed when maintaining the airworthiness of an "idle aircraft" even when its extended grounding is meticulously scheduled, this is additionally compounded for cases of prolonged parking in locations with limited capability/support regarding aircraft accessibility, availability of consumables – parts – GSE and specialised workforce, adverse meteorological phenomena (e.g. typhoon season) or an aggressively corrosive environment (e.g. atmospheric high salinity and humidity).

The airline crisis uncertainties and "in-flux" situation are taking their toll on the timeliness of decisions regarding aircraft fleet types and sizes for:

- active ready-to-fly parking or prolonged parking duration,
- storage or early lease returns and retirement – decommissioning with part-out opportunities.

3.2 Operational and efficiency considerations

The aircraft parking and storage possibilities envisaged by the OEM for the respective type are part of the AMM Chapter 10 Parking and Mooring. However, the latest changes and flexibilities provided by the OEMs for such possibilities may need to be tracked through other OEM specific documents (e.g. OIT, MOM etc) since they are not captured in the AMM (not even in TRs).

Airlines should ensure a timely and effective communication with their specific OEM for updates regarding aircraft parking and storage procedures.

It should be emphasized that, in general, maintenance tasks involved by such parking periods are not part of the MPD issued by the OEM. It is left to the OMP and its approving/accepting authority if the respective maintenance tasks are identified and incorporated in the document since they are not intended as a scheduled maintenance package to be performed during the operational life of an aircraft unless the unusual circumstances of aircraft parking occur.

There is a varied terminology used by the OEMs in designating the parked aircraft state and, although the technical implications are similar if not identical, they are not harmonised across the industry. The operator would encounter terms as aircraft: parking, immobilisation, prolonged parking, extended parking, active storage, short-term storage, prolonged and long-term storage, deep storage etc.

While the different OEMs may have different "names" identifying the type of aircraft grounding when the aircraft is not executing a flight, in general we could differentiate the following:

Normal Parking = the aircraft is on ground, between flights or maintenance events and for a period which typically could extend from a few hours or overnight to a few days. The aircraft is in an immediate ready-to-fly condition which could require some servicing tasks (like refuelling) and there is no specific maintenance action necessary involved by its "parked aircraft" status (except maybe a tire pressure check and removal of safety-pins and protection covers-plugs if installed).

Active (Short-Term) Parking = the aircraft is on ground, out of operation and not undergoing any scheduled maintenance event as part of the OMP or a modification/SB/AD action/campaign. The duration of parking is envisaged to exceed a few days (I.e. beyond a week) and extends to several weeks. The aircraft safety-pins, covers and plugs are installed and there is a limited/minimal initial preservation work involved at the beginning of the parking period. The aircraft is undergoing periodical maintenance tasks (in general on a weekly basis and multiple thereof) including APU and engine runs. The return to flight of the aircraft, while not immediate, could be done on a short notice (I.e. generally within the day).

Prolonged (Long-Term) Parking = the aircraft is on ground, out of operation and not undergoing any scheduled maintenance event as part of the OMP or a modification/SB/AD action/campaign. The duration of parking is envisaged to exceed a few weeks and extend to several months. The aircraft safety-pins, covers and plugs are installed and the initial preservation work involved at the beginning of the parking period is not necessary minimal (e.g. may include extensive landing gear lubrication, APU/engine fuel circuit preservation etc). The aircraft is undergoing periodical maintenance tasks (with only a few tasks kept at the weekly periodicity). Some aircraft LRUs (like engines and APU batteries) maybe removed from the aircraft between execution of periodic maintenance tasks but the aircraft configuration is otherwise kept intact with no missing parts/components. The return to flight of the aircraft on short notice is not possible.

Storage = the aircraft is grounded and out of operations for a medium to long period of time (generally envisaged to be in excess of 3-6 months) and in many cases stationed in a location with limited means and/or difficult timely access for qualified technical personnel. Many aircraft systems are in a preserved condition which doesn't allow their immediate operation or major parts have been removed and aircraft ballast installed (e.g. removal of batteries, oxygen bottles, fire bottles and even APU and/or engines etc). The aircraft RTS would require a sufficiently advanced notice.

The operator has several elements to consider and questions to answer when seeking to optimize its fleet decisions in this changing/evolving context with a significant uncertainty component:

- How much of the lift capacity of the fleet would likely be in demand for the next three months, half year, full year and beyond?
- Would the flight opportunities justify a minimal operational load to keep active a pool of aircraft in the fleet? how large would that pool be? could the active aircraft status with lower utilization rates be an option for all tail numbers in the fleet?
- Is the fleet actual aircraft configuration appropriate for the estimated flights or aircraft configuration adjustments would be needed? (e.g. readying passenger aircraft cabin for certain cargo transport operations)
- Does the airline have the material, organizational, technical, logistic and commercial structure required to support the fleet in view of the decision's implications/consequences? (e.g. stations-locations, accessibility, technical capabilities with GSE – specific ground services - consumables – parts – supply chain/logistics etc.)
- While "aircraft ready to fly" parking has minimal initial maintenance costs, the periodicity and extent of maintenance work required during the parking period is significant and so are the costs. This would make economically suboptimal such a decision if the parking horizon envisaged is beyond 3 months; the opposite is true for prolonged parking or storage where the initial costs are high but the minimal maintenance work required during the parking period would make it the economically optimal decision if the parking horizon envisaged is beyond 3 months (Note: the "economics" of a 3 months decision time vary; the OEMs are making major efforts to provide technical/maintenance grounds in support of a 6 months decision point, nevertheless using those technical alleviations must be assessed on an individual basis for the "economically optimum" decision)

The parking location should ensure the appropriate "wind facing aircraft" position as much as possible and the need for aircraft mooring should be considered as applicable (see AMM Chapter 10).

3.3 Operator's Maintenance Program (OMP) during the parking and storage period

The potential maintenance, logistic and economic burdens which could arise for the operators if the parking and storage requirements are only partially (or not at all) fulfilled should always be considered. Additionally, in order to optimize the value protection of their aircraft assets and prevent costly findings at the RTS phase, many operators are interested in customising the parking/storage maintenance program to address the individual aircraft condition with maintenance actions above and beyond the standard requirements.

There are two main categories/types of aircraft maintenance actions which the operators must address:

a. maintenance linked to initiating and sustaining aircraft parking/storage and related de-preservation for aircraft return to service

b. maintenance linked to the Operator's Maintenance Program under which the aircraft is approved to operate

The maintenance tasks under point "a" above could be seen as "opportunity-based" and are relying on the AMM Chapter 10 applicable content. The maintenance tasks under point "b" above are the ones included in the scheduled maintenance program applied by the operator to the respective aircraft and are relying on the MPD and MRBR documents.

In discharging its responsibilities for planning and execution of maintenance actions in both categories mentioned, the operator will have to consider ADs, SBs or other applicable documents originating from Regulators or OEMs.

While a grounded aircraft is always a loss of operator's lift capacity and related revenue generation, this represents a very good opportunity for aircraft maintenance work "catch-up" on previously delayed cabin modifications and refurbishment or incorporation of various applicable (but optional) SBs. A business decision for engaging in such maintenance would have to consider if the respective work is feasible from a technical capability stand-point under the relevant restrictions imposed by the crisis.

In the development of the OMP a certain aircraft utilization rate (in FH and FC) was assumed. While a change/switch to the aircraft "low utilization rate" maintenance program would not reduce the "maintenance burden" (and in fact the opposite could be expected), the utilization assumption should be considered when analysing the maintenance task effectiveness for any OMP optimization which is pursued in the crisis circumstances.

Although the reduced or completely stopped aircraft flight operations moved in the future the need for performing maintenance tasks controlled by aircraft actual utilization parameters (FH or FC), the tasks controlled by calendar time (CT) may still become due during this inactivity period. There are some limited time extension flexibilities which the OEMs made already available for most aircraft types (see Appendix B). Such extensions may be sometimes referred to from a practical perspective as "aircraft clock stoppage". This added flexibility to the DA Holder ICAs creates opportunities for operators to address not only the restrictions imposed at present time on maintenance activity (e.g. due to aircraft parking location, airspace closure etc) but also to avoid a possible bottleneck of potential overflow in maintenance needs at the time of restart of operations.

However, it should be clear to operators contemplating the use of such task escalation flexibility that the potential for maintenance findings and the work involved in restoring the aircraft part or system to the required airworthiness standard (e.g. addressing in-situ aircraft corrosion up to Level 1) would come at a cost. Additionally, for the aircraft still within the warranty period, any claims for repair work link-able to tasks that were escalated under the above-mentioned flexibility, maybe questioned by the OEMs.

The provisions for item "a" above generated maintenance tasks were recently revised by OEMs (see Appendix B) to incorporate in general additional flexibility/options regarding the threshold, interval, consumables and accomplishment instructions for such tasks.

In a circumstance of a maintenance task partial or total non-compliance, seeking OEM's guidance for options and support would be most valuable before the fact (i.e. if and when the likelihood of such non-compliance scenario is envisaged). Asking for OEM's guidance and alleviation measures after the fact (i.e. when such non-compliance already took place) is always more costly in time. effort and consequences.

This document is focused on the elements related to maintenance actions for the aircraft parking/storage and related de-preservation and aircraft return to service.

3.4 Aircraft systems specificities

While this section will identify some of the aircraft systems and equipment specific elements to consider, the discussion is kept to the generic level within the specified ATA focus. Additionally, the below presented selection of ATA chapters is not intended to provide an exhaustive and/or comprehensive selection of aircraft systems with required maintenance actions but rather to remind, by way of specific examples, the complexity of elements which must be considered when maintaining a parked/stored aircraft.

Operators are strongly advised to keep up to date with the applicable aircraft type information produced by the respective aircraft OEM. The timely technical information, available to operators through normal communication channels with their OEMs (e.g. www.airbusworld.com or www.myboeingfleet.com or www.flyembraer.com/irj/portal or www.ATRactive.com or http://eservices.aero.bombardier.com), **is essential to define the particular maintenance action applicability and execution details.**

The operators must be acutely aware of a series of interdependencies between tasks and also that using some task escalation flexibilities provided by the OEMs in this crisis context may lead to additional requirements at the time of aircraft return to service.

3.4.1 Electrical and avionics

The aircraft prolonged parking or storage procedures focused on electrical/electronic equipment and components should consider:

- Aircraft (electrical) grounding as required
- Control switches selection to "OFF" and CBs de-activation to "open"
- Check the batteries full-charge status before de-energizing the aircraft and physically disconnect the aircraft batteries between aircraft power-up cycles for maintenance
- Based on batteries' type and condition, parked aircraft environmental temperatures and maintenance action intervals, consider if batteries should be kept on-wing or be removed to be stored/serviced in the shop

- Validate if keeping avionics LRUs inactive on-aircraft between power-up cycles for maintenance is compatible with the parking/storage environmental conditions
- Capping of all disconnected electrical connectors
- Servicing requirements and operation periodicity of IDGs and VFGs

3.4.2 Flight controls

The preservation and maintenance of the system during parking includes in general (without being limited to):

- Keeping all surfaces clean, free of corrosion with all structural drain holes unobstructed
- Lubrication and temporary protective coating application if required
- Positioning of controls and flight control surfaces to neutral/stowed. Note: if required for the aircraft type, ensure that "gust locks" are installed/engaged
- Periodic power up of required systems (i.e. electric and hydraulic power) to check operation of all flight control surface on their complete range of travel. Note: include all primary and secondary flight control surfaces with their control and actuation channels/subsystems (mechanical – electric/electronic – hydraulic)

3.4.3 Engines and APU

In general, the engine and APU are following the parking/preservation program and applicable maintenance tasks identified by the aircraft OEM. Some airlines maybe interested in following the engine OEM preservation maintenance program to capture additional flexibility when offered by the engine OEM. While this "decoupling" of preservation programs between the aircraft and its engines maybe of interest especially when pursuing engine removal (i.e. ending with "off-aircraft engine") the airlines should pay attention to appropriately tracking criteria of the "asset" preservation tasks.

- Inlet and exhaust plugs/covers should be installed. Note: if the standard set is not available, alternatives may be used with OEM acceptance
- Ensure periodic engine shaft rotation/cranking as required (Note: it should address the engine LP, IP and HP spools)
- Engine periodic start and operation per the OEM suggested engine run profile (including T/R operation if required)
- Perform engine fuel system conservation as applicable
- Particular attention may be required to prevent engine inlet lip skin corrosion
- APU periodic start and operation
- APU fuel system conservation as applicable
- Engines and APU fire bottles deactivation/removal is considered

3.4.4 Landing gear, wheels and tires

The typical maintenance actions would include:

- Install landing gear safety pins and chock wheels
- Do a general visual inspection of the landing gear system, including wheels, tires and brakes before commencing the parking period
- Install protective covers as recommended
- Lubricate landing gear and landing gear doors per AMM
- Apply corrosion preventive compounds to all bare metal parts of the landing gear
- Periodically check tire pressure, tires for "hot spots" and rotate periodically tire/wheel to alternate the ground contact point
- Identify, troubleshoot and correct any shock absorber leaks of the landing gear (main gear or nose gear)
- Check landing shock absorbers' extension and nitrogen pressure. Service shock absorbers if required
- Change wheels or inspect and repack wheel bearings to prevent corrosion due to grease migration
- Operate gear steering system
- Operate braking system
- General check for corrosion of the landing gear, landing gear doors, actuating mechanism, landing gear steering mechanism and landing gear bay

Note:

- while OEM's requirement for operation of landing gear and doors (i.e. gear swings) may qualify for an extension of the task periodicity during parking, generally the task is required to be completed (including check of alternate extension operation) before the aircraft RTS.
- functional checks of the steering and braking system may also have a "recency condition" before RTS

3.4.5 Interiors

The entry/induction of the aircraft in a parking/preservation program is conditional to completion of several steps immediately after or sufficiently close to aircraft return from its last flight and before parking period/program starts. This includes the actions to ensure that aircraft water and waste system is serviced (drained – emptied – cleaned/vented), aircraft escape slides are secured in disarmed condition and all galley inserts are permanently removed from the aircraft.

The aircraft interiors related steps should include removal of trash/debris and surface cleaning of:

- galleys, lavatories and cabin monuments
- cabin seats and carpets

- cabin enclosures (e.g. cabinets, closets and overhead bins)
- FCR and CCR areas
- flight deck compartment
- cargo compartments

The periodic tasks during the parking period should ensure that:

- seats and carpets are inspected for moisture and mildew or other spoiling effects
- cabin average humidity is maintained below 70% (periodic operation the air conditioning system should address that). Note that employing aircraft independent de-humidifiers may be considered.
- doors and hatches are closed when aircraft is unattended
- the removal of slide/raft assemblies is considered as well as pax life vests
- the deactivation /removal of oxygen bottles/cylinders is considered

3.4.6 Fuel

The maintenance actions specific to the aircraft fuel system and fuel tanks should consider at a minimum to:

- Ensure for the entire parking period a fuel quantity in each tank of minimum 10% of the tank capacity

  Note: sometimes the parked aircraft weight is additionally increased by uploading a higher fuel quantity in the tanks in order to prevent aircraft from leaving its parked position under the effect of high winds

- If defueling is required, due to maintenance work to be carried out, it is the responsibility of the airline to ensure that the defueled fuel is used in the most expeditious manner to refuel the same aircraft or another aircraft owned by the same airline.
- Perform periodic water drainage of all fuel tanks
- Perform initial and periodic fuel sampling analysis for microbiological contamination of each fuel tank
- Ensure biocidal treatment of fuel tanks based on microbiological contamination monitoring (i.e. curative treatment)

Note:

- Biocide product use restrictions may apply for some aircraft locations, aircraft/engine types and biocide product type
- If biocides are prohibited or not available, the manual removal of the microbiological particles may be envisaged (check OEM documentation)
- In case of significant microbiological contamination repeated replacement of fuel filters of engines and APU maybe required for aircraft RTS and after an initial operations interval after aircraft RTS.

- If high level of microbial growth has been detected, active anti-microbial measures are required. The fuel contaminated cannot be re-cycled back into aviation fuel storage at any dilution despite its meeting the full specification tests.

3.4.7 Environmental Control System (ECS)

The various air conditioning subsystems will be operated mainly with the purpose of circulating the air in the cabin and to ensure ventilation for preserving an acceptable humidity level (below 70%).

While air conditioning packs and their ACMs usually rely on air bearings, servicing of existing lubrication systems on particular aircraft types should be ensured as applicable.

The ECS dedicated external air inlets and exhausts should be adequately protected during parking/storage (closed – covered – plugged).

3.4.8 Hydraulics

The aircraft hydraulic systems' operational status is needed for executing some of the maintenance tasks required during the aircraft parking period (e.g. depending on the aircraft type: movement of flight control surfaces, gear steering, gear doors, braking system etc.)

Appropriate servicing should be ensured before activating an aircraft hydraulic system (including the check of hydraulic reservoirs' fluid levels). The alternative to using the aircraft hydraulic pumps could be to use a ground hydraulic cart (GSE) to pressurize the system (with measures in place to avoid contamination of the aircraft hydraulic circuits).

Standard maintenance precautions should be followed for any maintenance work involving the high-pressure hydraulic circuit.

The parked aircraft periodic maintenance should include:

- Check for hydraulic system leaks
- Cleaning and lubrication of hydraulic actuator rods exposed to ambient environment

3.4.9 Air data probes and sensors

The aircraft probes and sensors should be protected with appropriate covers and plugs. This would ensure that corrosion or damage to the probes and sensors during parking is avoided/limited and any contamination of the probes and sensors ports or lines is prevented. Such contamination by insects' access and nesting is a frequent occurrence in grounded aircraft.

The systems' preservation actions should facilitate a smooth RTS which includes:

- Removal of all covers and plugs (special attention should be given to complete removal in case of using ad-hoc and non-standard protections for probes and sensors)
- Detailed inspection of all probes and sensors is completed including checking their drain holes for free and uncontaminated condition
- Inspection and contamination removal of all pitot-static lines of probes and sensors (with low pressure nitrogen blowing of lines as required)

- Completion of probes and sensors system functional checks as well as any required leak checks of the system

3.5 Aircraft security considerations

The following aircraft parking security considerations are listed here-below since they have an intrinsic link to the preservation of aircraft airworthiness elements during the parking period:

- the aircraft is stored in a physically controlled space or appropriate mechanisms are in place to ensure the aircraft is not tampered with during parking
- ensure that only personnel and equipment with appropriate identity, qualification and status credentials validated by and known to the aircraft operator/owner could access the aircraft
- ensure that any aircraft related action/event is accurately recorded in the appropriate technical and security logs

4 Aircraft Return to Service (RTS)

4.1 General considerations

The RTS phase should be carefully coordinated with consideration of all possible risks/hazards/mitigation measures which the airline captured in its SRA (see section 5).

The review and scrutiny of all maintenance work due for the aircraft and its components/parts is essential.

A point of particular focus should be the aircraft actual configuration, its cross-reference with the allowable configuration and the actions to address any existing gaps. This should cover both the aircraft hardware and software components / parts.

Additional attention should be given to appropriately address any aircraft components / parts removed for off-aircraft maintenance or storage events during the parking period as well as for any "aircraft cannibalisation" practices which could have occurred during that period.

4.2 Aircraft records

The accessibility/availability of aircraft records with a complete and accurate reflection of the aircraft state (including all its systems – equipment – components) as well as the related maintenance work which took place since the last flight before entering in the parking/storage procedure is essential for:

- enabling the aircraft return to the airworthiness status required for its release to service
- preserving the asset value for whatever the airline will decide for the particular aircraft (e.g. RTS, or lease return, or retirement for part-out and capitalization)

The form and format of such records (including but not limited to aircraft logs, engine logs, maintenance work packages, ADs & SBs status, LLPs report) must ensure the unaltered readability of information by any legitimate stakeholder (e.g. operator, owner, regulator). Special considerations would be required, in the prevalent e-records context of today, for addressing software portability/compatibility issues related to MIS files.

4.3 End of preservation and aircraft release to service

The end of aircraft preservation is defined as the termination of the aircraft parking/storage period and the return of the asset to its operational status following the appropriate maintenance actions finalized with the applicable aircraft release to service certification (CRS).

The scenario when the aircraft is returned to flight for a one-ime repositioning flown under a Flight Permit (FP) with associated Flight Conditions (FC) is not illustrative for the above definition.

4.4 Aircraft security considerations

The following aircraft security considerations are listed here-below since they have an intrinsic link to the aircraft airworthiness at de-preservation following its extended parking or storage and its subsequent release to service:

- Ensure effective screening procedures and security procedures are in place for who can access the airplane once the RTS process is initiated
- Validate the currency of credentials (including the qualification ones) of personnel involved in aircraft maintenance activity
- Aircraft hardware and software configurations are validated as having been done only under controlled access, by authorized personnel and are validated as appropriate through physical inspections
- Perform a complete review of aircraft technical logs and security logs for records made since last flight of the aircraft, identify and investigate any anomalies

4.5 Non-revenue flights

The operator should be aware of any aircraft OEM or CAA requirements for completing a non-revenue flight following a prolonged parking or storage period and before RTS for revenue flight. If such a flight is required, the intended flight profile should be clearly established to satisfy the requirements.

Whenever the in-flight required checks could be kept to a minimum by corresponding on-ground substituting steps, the operator should pursue that alternative if adequate ground support capabilities are available (e.g. a ground pressurization functional check may satisfy a lengthy flight one; performing aircraft on-jacks landing gear swings – including "free-fall" extension - may be an acceptable alternative to in-flight operation etc).

Sometimes the aircraft may have undergone significant maintenance work (e.g. scheduled base heavy-checks, modifications or repairs) in conjunction with the parking period or is completing an operator/owner transfer-delivery - lease return event at the end of that timeframe. Commercial commitments and/or operator's adopted practices may lead to execution of a check flight although this is not mandated by the Regulator or required by the OEM.

It is very important to consider that if a maintenance check flight (MCF) will be performed, based on the details of the flight profile and the complexity of in-flight check elements , certain regulatory requirements for the qualification and experience of the flight crew must be met as part of the specific MCF procedures and authorizations which the operator must hold for executing such flights.

4.6 OMP subsequent to parking and storage

The aircraft continuing airworthiness and reliability required in operations are heavily dependent on the OMP.

The parking/storage period may have brought elements which must be accurately captured in the subsequent implementation of the OMP (see considerations presented in section 3.3).

In particular, the use of OEM granted "limited" extensions for some due tasks threshold/periodicity must be accurately accounted for. The "cascading effect" of using such extensions will be reflected in additional and/or out of phase maintenance tasks and they may have to be established for a longer period of aircraft operations.

The RTS may coincide also with some aircraft modifications (e.g. changes in cabin configuration) which could lead to updates/adjustments, removal or addition of some maintenance tasks in the OMP.

The intensive sanitization program introduced in aircraft operations during the pandemic may raise additional maintenance actions in order to control any consequence on the aircraft interiors as a result of the high frequency of use of disinfecting products and the procedures to apply the products in the aircraft cabin and flight deck.

5 Safety risk and aircraft airworthiness

5.1 General recommendations

It is of the utmost importance that, for each individual aircraft in their fleet, operators are cognizant of the specifics regarding:

- Aircraft actual configuration and location (with details on aircraft accessibility and GSE availability, restrictions for APU and engine operation, fuel on board and last refuelling etc.)
- Maintenance and utilization status records (with last flight info, the maintenance program which the aircraft is undergoing and the performed maintenance tasks including any preservation work accomplished etc.)
- Eligibility and use of any maintenance tasks' extensions or exemptions or execution deviations (agreed to by the OEMs and/or granted by the Regulator)

Typically, operators shall perform a detailed safety risk assessment to identify hazards, evaluate and mitigate correlated risks. Some examples of possible risks include, but are not limited to, the following:

- Restrictions imposed by aircraft accessibility and/or location
- Aircraft required and intended work package
- Proficiency of available personnel
- Availability of facilities and GSE
- Availability of consumables and parts
- Availability of tools with valid calibration

5.2 Safety Risk Assessment (SRA)

The Safety Risk Assessment template provides a sample of the most common hazards, risks and mitigation actions. It is not intended to be an exhaustive list. Each operator must verify and adjust their risk assessment in accordance with company policies and operations.

- It is assumed that each mitigating action that an operator would pursue is implemented only by the competent personnel with appropriate training, qualification and authorization.

Event	Hazard	Consequence	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
		(worst case scenario)		Probability	Severity	Rating				Probability	Severity	Rating
Organisation's Capability and Resources (e.g. certifications, personnel, GSE, consumables and parts, accessibility etc.)												
Expiration of validity of operator's AOC	The operator losses its regulatory established quality/roles/responsibilities towards management of the continuing airworthiness of its fleet of aircraft and, consequently, the recognition of the operator's actions for aircraft continuing airworthiness could be lost.	Invalidation of Operator's performed aircraft airworthiness related actions/work Grounded fleet				Intolerable	Ensure the continued validity of the AOC by requesting to the CAA of the State of the Operator an extension of the AOC validity (based on exemption or alleviation mechanism) until emergence from pandemic restrictions.					Tolerable (with mitigation actions)
Expiration of validity of CAMO certification of an organization executing continuing airworthiness work for the operator's fleet.	The said CAMO loses the regulatory recognition to perform the continuing airworthiness services within the scope of its approval.	The Operator cannot receive continuing airworthiness services from said CAMO organization Grounded fleet				Intolerable	The Operator subcontracts the respective continuing airworthiness work/services to another CAMO with valid certification or develops the required in-house capability					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Expiration of validity of AMO certificate of an organization responsible for execution of maintenance work on operator's fleet	The said AMO loses the regulatory recognition to perform aircraft maintenance work within the scope of its approval.	The Operator cannot use said AMO for maintenance work on its fleet of aircraft Grounded fleet				Intolerable	The Operator subcontracts the respective aircraft maintenance work to another AMO with a valid certification or free-up the in-house capacity.					Tolerable (with mitigation actions)
Expiration of individual aircraft CofA or supporting ARC for an aircraft in the operator's fleet	The Operator would loose some of its lift capability by having the individual aircraft grounded and the asset would be immobilized at its current location.	The individual aircraft is legally grounded in a location where pursuing a renewal/extension of the CofA is not possible				Intolerable	Ensure the continued validity of the aircraft CofA by requesting to the CAA of the State of Registry an extension of the CofA validity (based on exemption or alleviation mechanism) until emergence from pandemic restrictions. If such continuation of CofA would not be obtainable, a Permit to Fly with appropriate Flight Conditions should be requested for repositioning the aircraft to a suitable location as applicable.					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Aircraft Parking or Storage Process & Procedures												
Parking aircraft in positions designated outside the typical areas for aircraft stationed or in-traffic surfaces (e.g. apron-taxiway-runway) of an airport.	Aircraft presence limited/missing signalization Congestion Limited access and support for required periodic execution of parked aircraft maintenance tasks (may require aircraft re-positioning)	Significant aircraft damage and / or employee injury				Tolerable (with existing controls)	Provide temporary ground markings, area signalization and illumination as well as aircraft's zonal limits visible flagging and use of wing walkers Create access paths for position of adequate GSE or temporary re-location of the aircraft for execution of maintenance tasks					Tolerable (with mitigation actions)
Improper parking / stowage for the local environmental conditions	Environmental conditions (wind/storm, humidity, temperature, salinity etc) leading to aircraft damage (tip over, corrosion etc)	Significant aircraft damage and / or employee injury				Tolerable (with existing controls)	Per the OEM recommendations, airline SOPs and local characteristics (parking in wind, tie-down, aircraft relocation)					Tolerable (with mitigation actions)
Prolonged parking without required protective covers and plugs installed	Limited availability of AMM specified aircraft standard sets of protective covers and plugs for prolonged parking.	Significant aircraft damage				Tolerable (with existing controls)	Use OEM accepted alternatives to manufacture and install non-standard protective covers and plugs for prolonged parking within the required timeframe.					Tolerable (with mitigation actions)
Prolonged parking with inadequate preservation or maintenance	Necessary maintenance tasks required for parked aircraft tailored for each individual tail number in the proper time frame (threshold and periodicity) not tracked	Significant aircraft damage				Tolerable (with existing controls)	Weekly review of aircraft status and records in the MIS with cross-reference to OEM technical updates for parked aircraft requirements.					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Prolonged parking with inadequate record keeping	Missing or incomplete records documenting the aircraft maintenance work executed during the prolonged parking period	Asset financial degradation Financial cost of unnecessary rework				Tolerable (with existing controls)	Institute temporary dual-path tracking of executed maintenance tasks in view of reconciling that for timely entrance in the MIS Re-constitute records for completeness					Tolerable (with mitigation actions)
Operation of aircraft engines (idle or above) including T/R operation as required by maintenance tasks.	Aircraft parked in area generally not used for aircraft presence with engines in operation	Personnel fatality				Intolerable	Ensure visibility of "aircraft with running engine" status, instruct personnel, communicate, signal and secure aircraft proximity dangerous areas during engine in operation					Tolerable (with mitigation actions)
FOD ingested during operation of aircraft engines (idle or above) including T/R operation as required by maintenance tasks.	Aircraft parked in area generally not used for aircraft presence with engines in operation	Significant aircraft damage				Tolerable (with existing controls)	Execute additional inspection for and removal of FOD in the proximity of the aircraft before engine operation					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Microbiological contamination of aircraft fuel system	Non-compliance with individual aircraft fuel contamination program: scheduled aircraft fuel samples collection time and periodicity, collection procedure (i.e. per each fuel tank), laboratory analysis and results' assessment,	Hull loss				Intolerable	-For long term storage, Operators usually use Biocide as a preventative application, or when microbial growth is detected. -Routine water removal (sumping) -Some aircraft are fitted with scavenging systems to remove water from the fuel tanks continuously. -Follow up-to date AMO procedures to ensure that the biocide treatment is performed in accordance with the relevant AMM task. -Remove the contaminated fuel and investigate the source of the contamination. -Fuel suppliers to have an adequate quality assurance procedures in place to ensure any biocides used is well controlled					Tolerable (with mitigation actions)
Aircraft Return to Service Process & Procedures												
Aircraft flying while not having the required state of airworthiness	Missing maintenance actions due before aircraft RTS	Hull loss				Intolerable	Review all documentation of aircraft status and undergone maintenance actions during the entire period of parking/storage, and address required maintenance actions before aircraft release for RTS					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Configuration not fit for flight (e.g. lacking airworthiness validity of some parts and/or software uploads) due to changes during the parking period	Degraded aircraft capabilities and performance	Hull loss				Intolerable	Review aircraft config data (MIS cross-reference etc) and update/correct as applicable the actual configuration of the aircraft before release for RTS.					Tolerable (with mitigation actions)
Unskilled personnel performing RTS check-flights	Degraded personnel capabilities and performance due to minimal operations (e.g. maintenance check flights, pilot training flights)	Hull loss				Intolerable	Engage in planning and preparation efforts well resourced and timed by the operator (e.g. definition of in-flight maintenance check-points and MCF program)					Tolerable (with mitigation actions)
Maintenance task extension	Operator incomplete tracking of "out of phase" maintenance tasks generated as a result of tasks' due threshold/periodicity extension use	Aircraft grounded Aircraft to undergo maintenance events post operational restart (i.e. after RTS) but prior or in addition to the typical OMP maintenance packages				Intolerable	Complete the required maintenance actions before aircraft release for RTS Ensure the appropriate amendment of MIS data to reflect accurately the tail number maintenance info and enable accurate tracking of "out of phase" maintenance tasks					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Missed maintenance task(s)	Operator incomplete tracking of maintenance work-package including the planning and execution of tasks which are not part of the "regular" scheduled maintenance work packages based on the OMP, for each tail number	Hull loss				Intolerable	Two ways cross-referencing of work package content with OEM specific recommendations					Tolerable (with mitigation actions)

Event	Hazard	Consequence (worst case scenario)	Existing Controls	Risk			Mitigation Action	Ownership	New Controls	Risk		
				Probability	Severity	Rating				Probability	Severity	Rating
Microbiological contamination of aircraft fuel system	Corrosion of metallic structures, fuel quantity indication problems, and blocking of the scavenger systems and fuel filters during flight	Hull loss				Intolerable	Institute quality assurance procedures in place Review records of biocide treatments. Operators usually use Biocide as a preventative application, or when microbial growth is detected. -Routine water removal (sumping) -Some aircraft are fitted with scavenging systems to remove water from the fuel tanks continuously. -Follow up-to date AMO procedures to ensure that the biocide treatment is performed in accordance with the relevant AMM task. -Remove the contaminated fuel and investigate the source of the contamination. -Fuel suppliers to have an adequate quality assurance procedures in place to ensure any biocides used is well controlled					Tolerable (with mitigation actions)

6 Regulatory requirements

6.1 General

The various Civil Aviation Authorities (CAA) have initiated the effort to identify and implement alternatives to their regulatory provisions which would enable Operators to secure equivalent levels of safety while the airline activity is confronting the operational challenges and restrictions caused by the COVID-19 worldwide crisis.

6.2 Regulatory references

The regulatory bodies and the regulatory links/documents referenced below are only a sample for the relevant adopted measures, they are listed only for general awareness and Operators are advised to keep in permanent communication with their competent CAA. The update and applicability of the referred to regulatory documents listed here-by should be pursued by the Operator with the relevant CAA on a case by case basis.

ICAO:

- https://www.icao.int/covid/cart/Pages/Aircraft-Module.aspx
- https://www.icao.int/safety/COVID-19OPS/Pages/QRGs.aspx
- Continued validity of maintenance organization approvals_v1.0

FAA:

- https://www.faa.gov/news/updates/?newsId=94991
- Cert Alert - Temporary Parking of Overflow Aircraft
- SAFO - Transporting Cargo on Transport-Category Airplanes Configured to Carry Passengers
- Exemption for Transporting Cargo on Airplane Seats (Exemption 18561)

EASA:

- https://www.easa.europa.eu/easa-covid-19-resources
- Guidelines for the transport of cargo in passenger aircraft exemptions under Article 71(1) of Regulation 2018/1139
- Proposed Special Condition on transportation of cargo in passenger compartment

TCCA:

- https://www.tc.gc.ca/en/initiatives/covid-19-measures-updates-guidance-tc/aviation.html
- NCR-029-2020, Exemption from section 403.04 of the Canadian Aviation Regulations, extending the validity period for all Aircraft Maintenance Engineer (AME) licenses to August 31, 2020.
- IPB 2020-01, Authorizing Deviations From Approved Maintenance Schedules Made Necessary by COVID-19 Disruptions
- IPB 2020-09, Conducting Onsite Activities During The COVID-19 Pandemic

7 Commercial requirements

While the airworthy condition of the aircraft is essentially determined by compliance with technical and related regulatory requirements, there are many commercial aspects which could facilitate or impede this compliance.

The airline should perform a careful review Aircraft and Component related contractual agreements to ensure that certain commercial requirements will be met. These include but are not limited to:

- Aircraft Leasing agreements, maintenance reserves, conditions for engines and other components, aircraft records etc.
- Engine Leasing and Flight by Hour Engine Maintenance agreements including record keeping
- Supply Chain agreements especially involving pooling of various aircraft components
- Other Technical Operations / Supply Chain agreements that may have:
    - Minimum flight commitments,
    - Specific Turn Times that cannot be met due to part shortages and/or labor restrictions (travel bans, physical distancing),
    - Minimum order requirements that are no more essential but may impose burden on ether the airline or the supplier side

It is recommended that Operators fully understand provisions in their contracts that may be applicable because of the crisis and the aircraft grounding situation. If questions, please try to work out a mutually agreeable solution and keep constant communication with your providers. In addition, try to keep the records of the aircraft and its components in the best possible condition as they are traded frequently among operators.

8 Feedback and Support

For feedback, questions and/or clarifications please write to techops@iata.org

9 Appendix A – Abbreviations and Acronyms

Acronym	Term
ACM	Air Cycle Machine
AD	Airworthiness Directive
AMM	Aircraft Maintenance Manual
APU	Auxiliary Power Unit
CAA	Civil Aviation Authority
CB	Circuit Breaker
CCR	Cabin Crew Rest (area)
CRS	Certificate of Release to Service
CT	Calendar Time
DA	Design Approval
EASA	European Union Aviation Safety Agency
ECS	(Aircraft) Environmental Control System
FAA	Federal Aviation Administration
FC	Flight Cycle or Flight Conditions
FCR	Flight Crew Rest (area)
FH	Flight Hour
FP	Flight Permit
GSE	Ground Support Equipment
IATA	International Air Transport Association
ICA	Instructions for Continued Airworthiness
ICAO	International Civil Aviation Organization
IDG	Integrated Drive Generator
IP	Intellectual Property
IRM	IOSA Reference Manual
LLP	Life Limited Part
LP/IP/HP	Low/Intermediate/High Pressure
LRU	Line Replaceable Unit
MCF	Maintenance Check Flight
MIS	Maintenance Information System
MOM	Multi Operator Message
MPD	Maintenance Planning Document
MRBR	Maintenance Review Board Report
OEM	Original Equipment Manufacturer
OIT	Operators Information Transmission
OMP	Operator Maintenance Program
RPK	Revenue Passenger Kilometers
RTS	Return to Service
SB	Service Bulletin

SRA	Safety Risk Assessment
TCCA	Transport Canada Civil Aviation
VFG	Variable Frequency Generator

10 Appendix B – Examples of OEMs' documents

The following list of OEM issued documents in support of Operators' optimization of their maintenance actions during aircraft parking/storage, as well as other alleviations related to means of ensuring the aircraft airworthiness related to the pandemic crisis, is including only examples of OEM documents at the time of issuing this edition of the IATA Guidance. The list should not be deemed as complete/exhaustive for the aircraft OEMs and their related documents nor should it be considered as current.

Operators are strongly advised to contact the relevant OEM directly to ensure that the information governing aircraft operations is based on the appropriate document at its latest revision applicable to the specific aircraft.

OEM	Doc Reference	Synopsis
Airbus	OIT_999.0073/13	Parking and Storage procedures
Airbus	OIT_999.00019/20	Parking and Storage procedures: exceptional procedures and recommendations related to Covid-19 massive Grounding situation
Airbus	OIT_999.0026/20	Scheduled Maintenance Clock Stoppage further to Covid-19 Grounding situation
Airbus	FOT_999.0028/20	Cargo in Cabin
ATR	OIM 2020-004	Adapted aircraft preservation program due to COVID exceptional context; aircraft immobilization extension program; includes scheduled maintenance tasks "clock stoppage" considerations for stored aircraft
ATR	OIM 2020-003	General guidance on carrying humanitarian aid and cargo on a passenger aircraft as a result of the COVID-19 crisis.
Boeing	Multi-model Parking and Storage	Various models extensions of: Normal Parking from 7 to 14 days and Active Storage from 60 (or 90) days to 180 days
Boeing	MOM-MOM-20-0053	Information about disinfectant material that can be used on airplanes associated with suspect cases of 2019 Novel Coronavirus (2019-nCoV); information on High-Efficiency Particulate Air (HEPA) Filters and operational considerations
Boeing	MOM-MOM-20-0239	All Model Guidelines for Passenger Airplane Carriage of Cargo; general guidance on carrying humanitarian aid and cargo as a result of the COVID-19 crisis
De Havilland	Dash 8-400 RIL 84-10-002C	0 to 28 Day Storage Temporary Allowance
De Havilland	Dash 8-400 RIL 84-10-003C	29 to 90 Day Storage Temporary Allowance
De Havilland	Dash 8-400 RIL 84-10-004A	Up to 180 Day Storage Temporary Allowance
De Havilland	Dash 8-400-AOM-856	Biocide Treatment of Fuel