

International Maintenance Review Board Policy Board (IMRBPB)

Issue Paper (IP)

IP Number: CIP_EASA_02

Initial Date (26/Jun/2020):

Revision / Date (DD/MMM/YYYY):

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Retroactivity (Y/N): N

Title:	The role of an L/HIRF assurance plan in MSG-3
Submitter:	EASA

Applies To:	
MSG-3 Vol 1	X
MSG-3 Vol 2	X
IMPS	

Issue:

Clarification of a conflict between current MSG-3 and certification guidance material wording

Problem:

In the current MSG-3 L/HIRF logic introduced with MSG-3 Revision 2013.1, the fact that an LHSI is covered by an L/HIRF Assurance Plan, can be used to justify that the protection component is sufficiently covered, and *no standalone task is required*, monitoring the item with Assurance Plan (or equivalent validation program) is sufficient.
(Decision Box 17 and Box 19 of Figure 2-6-1.3, Step 17 and 19 of chapter 2-6-1.3)

Certification guidance material (e.g. FAA AC 20-158A , EASA AMC 20-158, SAE ARP 5583a, EUROCAE ED-107A) however states:

*Appropriate maintenance procedures should be defined for these devices and features to ensure in-service protection integrity. **A HIRF protection assurance programme may be necessary to verify that the maintenance procedures are adequate.***

(Note: AC 20-136 / AMC 20.136 cover lightning separately, so the assurance programme mentioned in the above documents is only called HIRF assurance programme, but similar wording exists for a lightning assurance programme)

So the idea of the L/HIRF assurance plan is to verify that the selected L/HIRF maintenance tasks are indeed effective.

The introduction of some existing assurance plans of major airframe manufacturers do state the same.

So using the L/HIRF assurance plan, intended to verify the maintenance tasks, to justify that no maintenance tasks are required is against the philosophy of this plan.

The current wording of MSG-3 also implies that the L/HIRF Assurance Plan will monitor the LHSI, while in fact only very small sample of components is indeed covered.

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However, also the Zonal Program as developed during the MRB process using MSG-3 formally is scheduled maintenance, and an L/HIRF assurance programme may verify, that LHSI are appropriately covered by a Zonal GVI, with no standalone task created. So in fact what MSG-3 currently calls "no dedicated task" means that the item is maintained through the Zonal Program.

With MSG-3 Rev. 2013 the formal transfer of L/HIRF tasks to the Zonal Program has been deleted, however if we want to avoid to create a dedicated L/HIRF based on an Assurance Program, which according to the certification terminology shall validate that the items are appropriately covered by maintenance, than we must not only check that the according item is covered by the assurance programme, but also that it is adequately covered by the Zonal Program.

Note that ARP 5583a states:

The maintenance program activities may not directly determine the HIRF protection effectiveness, but may look for indirect indications that would represent degradation. For example, visual inspections may look for connector corrosion that would indicate the potential for increased shield bonding resistance. But the shielding effectiveness itself can only be determined by direct measurement, which may be accomplished by the assurance program.

The extent of the surveillance program depends on the scope of the aircraft maintenance program. A surveillance program is needed if the maintenance program does not directly determine the effectiveness of the HIRF protection. For example, if the maintenance program relies upon visual inspections to determine if wire shielding or raceways continue to provide effective protection, then the surveillance program should include direct measurements on an agreed-upon set of protection features.

In contrast, if the maintenance program incorporates direct measurement of the protection elements, then the surveillance program may not be required for these elements. Again, an example is if the maintenance includes shield and connector loop resistance measurements, a surveillance program is not necessary for the shield and connector protection effectiveness, and may only be used to establish applicable inspection intervals.

This philosophy is currently not clear in the selected MSG-3 wording, The note in Step 13 somehow addresses this topic, but is not widely understood.

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Recommendation (including Implementation):

Harmonize the wording between MSG-3 and certification guidance material and rename the L/HIRF assurance *plan* to L/HIRF assurance *programme*. It is understood that at the time of the initial MRB the assurance programme is potentially still a plan, however to be effective it has to finally become a programme.

Clarify that an L/HIRF assurance plan is not the replacement for a task, but potentially a way to allow for simpler tasks (e.g. just checking for the external condition of items to detect hidden internal deterioration), or potentially for covering the LHSI by the Zonal programme.

As certification covers lightning and HIRF by separate requirements and guidance material, clarify the MSG-3 term L/HIRF.

Amend/Change Logic Diagram 2-6-1.1 and according Analysis Methodology

Step 16: **Is there an L/HIRF Assurance Program (or equivalent) to support the assumption that internal deterioration can be detected by external inspection ?**

OEM must provide details in the L/HIRF Assurance ~~Plan~~ Program and details of expected internal and external deterioration to satisfy the working group that the degradation concern is sufficiently covered by external visual inspection. The L/HIRF Assurance program (or equivalent validation program) will validate this assumption by dedicated sampling tasks (e.g. resistance or impedance measurement) to demonstrate that no degradation of the internal protection will occur without externally visible signs detectable during Zonal inspections. If the need for a task is based on unfavorable in-service experience, it is not a candidate for coverage by external visual inspections and the L/HIRF Assurance ~~Plan~~ Program.

Step 17: **Can externally visible signs of deterioration be timely detected by Zonal GVI ?**

The Working Group will assess whether the external deterioration provided under Step 16 and the location/visibility of the L/HIRF protection components of the LHSI will allow to timely detect deterioration by the zonal program.

Step 18: **Selected standalone task as determined will be submitted for inclusion in the MRBR to assure timely detection**

The task as developed in steps 12, 13 and 15 will be published in the MRBR to directly detect deterioration of the L/HIRF protection.

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Step 19: Standalone external inspection monitored by an L/HIRF Assurance Program (or equivalent validation program) will be submitted for inclusion in the MRBR to assure timely detection

An external inspection of the L/HIRF protection component will indirectly detect deterioration in place of a dedicated tasks. The L/HIRF Assurance Program will validate that external deterioration of the component adequately allows to detect internal degradation of the protection. (e.g. that corrosion of internal shielding components can be detected by external corrosion of the according connector) When Engineering and the ISC have determined that sufficient data has been collected to validate this assumption, permanent replacement of the recommended dedicated task by an inspection can be agreed on.

Step 20: No standalone task required, The Zonal Program monitored by an L/HIRF Assurance Program (or equivalent validation program) will be submitted for inclusion in the MRBR to assure timely detection

The Zonal Program will indirectly detect deterioration of L/HIRF protection components in place of a dedicated tasks. The L/HIRF Assurance Plan will validate that external deterioration of the component, detectable by Zonal inspections, allows to adequately detect internal degradation of the protection. (e.g. that corrosion of internal shielding components can be detected by external corrosion of the according connector) When OEM Engineering and the ISC have determined that sufficient data has been collected to validate this assumption, permanent replacement of the recommended dedicated task by the Zonal Program can be agreed on, and no stand-alone task is required in the MRBR any more.

NOTE: If an L/HIRF Assurance ~~Plan~~ Program is discontinued, OEM has the responsibility to either use the collected data to support that deterioration can be controlled by visual inspections or the Zonal program, or to institute the original dedicated task into the maintenance program.

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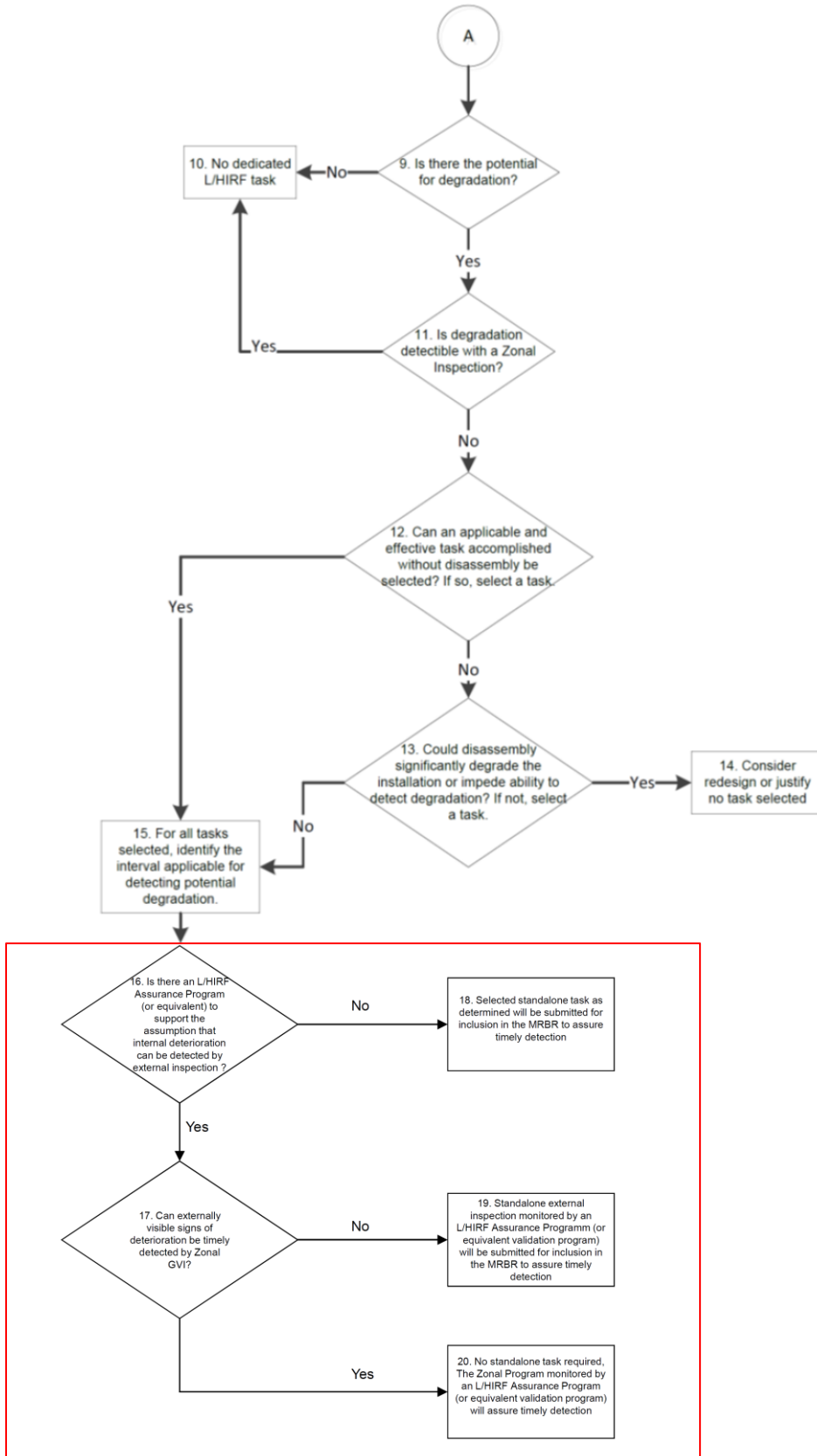
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Figure 2-6-1.3 L/HIRF Protection MSG-3 Logic Diagram (part 2)



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Amend/Change Appendix A. (Glossary)

L/HIRF

A term combining the aspects of direct and indirect effects of lightning (L) and high-intensity radiated fields (HIRF)

L/HIRF Assurance Programme

A fleet level sampling programme of dedicated tasks (e.g. circuit impedance measurement, resistance measurement) to verify that the maintenance programme adequately ensures in-service integrity of L/HIRF protection components over the life of the aircraft

L/HIRF Characteristics

Those properties of L/HIRF protection components that are necessary to perform their intended L/HIRF protection function(s).

IMRBPB Position:

Date:

Position:

Recommendation for Implementation:

Status of the Issue Paper:

☒

Active

☐

Incorporated in MSG-3 / IMPS (with details)

☐

Archived