



DIRECTORATE GENERAL TECHNICAL AIRWORTHINESS
Australian Defence Force

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DECIDING SERVICEABILITY CRITERIA WITHIN AMOs

Introduction

1. Allowing authorised AMO maintenance staff to make defined engineering decisions is a long-standing, accepted element of the ADF's technical airworthiness framework. Localised, time-critical, risk-based decision-making is entirely appropriate in some situations to increase operational availability or improve efficiency in the maintenance effort. One type of engineering decision that may be made, in defined circumstances, is a decision on serviceability criteria.¹
2. The Report of the Sea King BOI made a finding relevant to this type of engineering decision. This finding has caused concern, within parts of the ADF maintenance workforce, as to the roles, responsibilities and personal liability of AMO engineering decision-makers and those who advise them.
3. The BOI recommended that DGTA make necessary regulatory amendments to provide clarity on when AEO direction must be sought with respect to serviceability criteria. These amendments will be made to the AAP 7001.053 in 2008. To reduce existing concerns, there is a need for quicker DGTA direction.

Purpose

4. The purpose of this Position Paper is to provide clarity on the circumstances in which AMO maintenance staff can decide serviceability criteria, and who can provide advice to inform this type of decision. It aims to explain an enduring technical airworthiness principle, which is commonly known and understood, but which, until now, has never been explicitly documented.

Deciding serviceability criteria

5. Creating new serviceability criteria, and amending existing criteria are engineering decisions. Applying those criteria to decide whether a component² is serviceable is a maintenance decision. Deciding serviceability criteria is the normal purview of the Authorised Engineering Organisation (AEO). Nevertheless, in some defined circumstances maintenance staff are able to decide serviceability criteria.

¹ Other types of engineering decisions that may be authorised within an AMO are Carried Forward Unserviceabilities, and the ability to vary, within limits, published maintenance procedures.

² The term 'component' will be used in this paper as a generic term for all parts of a system, including structural elements and fasteners.

6. Note that it is not possible to determine a component's serviceability without using serviceability criteria.

Link between criteria and disposition of unserviceability

7. Once a component has been determined to be unserviceable, it may be dispositioned in one of two ways. First, it may be repaired so as to return the component to serviceability before the next flight. Second, the unserviceability may be carried forward using the established CFU process.

8. Importantly, any work required to confirm the unserviceability of the component, including decisions on serviceability criteria, is a necessary precondition to initiating the CFU process, but it is not part of the CFU process. The CFU process may only begin once a component is determined to be unserviceable.

Types of serviceability criteria

9. There are two broad types of serviceability criteria. The first type is objective in that it requires maintenance staff to determine the value of a measurable parameter and compare that measurement against a defined value. Such measurable parameters include fluid level, pressure, temperature, time, resistance, weight, leakage rate and physical dimensions. The defined value is specific to the component in its aircraft application. For example, whilst leakage rate is relevant in determining the serviceability of all hydraulic actuators, the defined value may vary in different applications. The same actuator, fitted to different aircraft, may have different allowable leakage rates.

10. The second type of criteria applies to unserviceabilities which cannot always be defined by measurable parameters. The AEO recognises and accepts that these subjective criteria require maintenance staff to apply their training and experience to determine whether, for example, there is 'free play', 'corrosion', contamination by oil and grease', 'adequate clearance' or 'loose rivets and fasteners'.

Publishing serviceability criteria

11. Serviceability criteria are published in different types of maintenance publications. First, an AEO responsible for a system will publish both objective and subjective criteria, relevant to a particular component, in the component's maintenance manuals. For example, the maintenance manual for a hydraulic component fitted to the Caribou may have specific serviceability criteria for allowable pressures and leakage rates.

12. Second, AEOs publish both objective and subjective criteria in the servicing schedules and scheduled servicing worksheets for systems and their components. Both types of criteria may be documented for a specific component. Subjective criteria are commonly implied by zonal inspections during scheduled servicings. These inspections use standard terms and words³ that invoke universally recognised serviceability criteria, such as:

- a. Any incorrect sequencing of assembly or orientation of assembled components is an unserviceability.

³ Refer to AAP 7001.038 (AM1)

- b. Any missing component constitute an unserviceability.
- c. Any component that physical interferes with the function or performance of another component is an unserviceability.
- d. Any failed locking device is an unserviceability.

13. Third, DGTA and AEOs with broader technology-based responsibilities may publish, in generic technology manuals, serviceability criteria relevant to components used across multiple systems. For example, there are serviceability criteria relevant to aircraft wiring, structural repair and the integrity of fasteners.

Time-critical decision-making

14. Three different scenarios are explored in this paper. In each scenario the regulatory position described is based on the principle that:

Where resolving uncertainty about serviceability criteria would markedly reduce operational availability or maintenance efficiency, then it is reasonable to quickly default to deciding the component is unserviceable and then apply rigour to disposition the unserviceability.

Scenario 1 - Clear serviceability criteria

15. For some types of potential unserviceabilities on specific components, the serviceability criteria are unambiguous, clear and sufficient. AMO maintenance staff do not usually require advice on the criteria or its application to the component. **In this scenario maintenance staff have no discretion to create new criteria or modify existing criteria without reference to the AEO.** Maintenance staff must apply the specified criteria to decide whether the component is serviceable or unserviceable.

Scenario 2 – Unclear serviceability criteria

16. In this scenario there are documented criteria for a potential unserviceability of a specific component. Nevertheless, AMO maintenance staff may consider that the criteria may be interpreted in different ways. There may also be conflicting criteria relevant to the same component. AMO staff may choose to seek direction from the relevant AEO. When they consider that seeking AEO direction would markedly decrease operational availability or maintenance efficiency, they must elect to choose the reasonable interpretation that makes the component more likely to be unserviceable.

17. For example, one reasonable interpretation of the criteria may lead to a decision that the component is serviceable and another reasonable interpretation may lead to a decision that the component is unserviceable. If there is no reference to the AEO, the maintenance staff **must default** to the interpretation which makes the component unserviceable.

18. In another situation, one interpretation of the criteria may set a higher standard of serviceability than other interpretations. Maintenance staff **must default** to selecting the more conservative interpretation. The outcome might still be that the component is serviceable, but it is a tougher test.

19. Note that subjective serviceability criteria are not, by their nature, always within this scenario. The absence of measurable parameters does not, by itself, make the criteria unclear.

20. If the documented serviceability criteria are so vague or insufficient, as to be incapable of reasonable interpretation, maintenance staff are to assume that no criteria have been published. Maintenance staff must then treat the decision as discussed in Scenario 3 below.

Scenario 3 - No documented serviceability criteria

21. In this scenario, there are no serviceability criteria specifically documented for the particular potential fault. For example, this scenario may arise during an unscheduled arising, since the criteria documented in the scheduled servicing worksheets do not, at face value, apply to unscheduled arisings. **In this situation AMO maintenance staff should use these documented scheduled serviceability criteria to the extent they are relevant.**

22. If there are still no relevant documented criteria, AMO maintenance staff may choose to seek immediate direction from the AEO. When they consider that seeking AEO direction would markedly decrease operational availability or maintenance efficiency, they must develop relevant serviceability criteria **that make the component unserviceable.**

23. For example, during an unscheduled replacement of a hydraulic line in an aircraft's wheel well, a potential unserviceability in another component may be detected. If there are relevant serviceability criteria in the wheel well's zonal inspection in the R2's worksheets, these criteria may be used. If there are no criteria in the worksheets, no criteria in the component's maintenance manual and no criteria in generic technology manuals, then maintenance staff **must seek AEO direction or create criteria which makes the component unserviceable.**

Which AMO maintenance staff can decide serviceability criteria?

24. **Scenario 1.** In this scenario there is no decision-making by maintenance staff.

25. **Scenario 2.** Deciding whether an interpretation is reasonable requires judgement. Therefore, the choices between reasonable interpretations must be made by maintenance staff of at least Trade Supervisor status. Trade supervisors in doubt about their interpretations are to seek the advice of, or refer the serviceability criteria decision to, their senior maintenance staff.

26. **Scenario 3.** In Scenario 3, all authorised maintenance tradesmen, irrespective of rank or position, can decide serviceability criteria in accordance with the limitation discussed above. The rationale for this broad authorisation is the severe and conservative constraints on maintenance staff's ability to decide criteria.

27. **SMM discretion.** SMMs may choose to exercise tighter control, within their AMOs, on who can decide serviceability criteria in scenarios 2 and 3.

Seeking advice

28. To inform the decision on serviceability criteria, the decision-maker may choose to seek advice from other people⁴ on:

- a. the documented location of relevant serviceability criteria;
- b. deciding serviceability criteria for those situations in which AMO maintenance staff can create criteria (as discussed at Scenario 3); and
- c. how to apply a conservative interpretation to existing criteria open to various interpretations (as discussed at Scenario 2);

29. In the ADF technical airworthiness framework, there is no concept of 'authoritative engineering advice' being provided to AMO maintenance staff making decisions on, or applying, serviceability criteria. **There is not, nor has there ever been, a concept that people must be authorised to provide advice to decision-makers who seek advice.**

30. Importantly, any person asked to provide advice should, to the extent that he or she considers capable to comment⁵:

- a. refer the tradesman asking the question to the relevant part, if it exists, of the authorised documentation that provides serviceability criteria;
- b. provide advice on interpretation of serviceability criteria open to multiple reasonable interpretations;
- c. suggest serviceability criteria allowable under Scenario 3; and
- d. comment on the developing view of serviceability criteria expressed by the decision-maker.

Operational Availability and maintenance efficiency

31. This Position Paper discusses the ability of AMO maintenance staff to take specific engineering decisions, when transferring the decision to the AEO would markedly reduce operational availability or maintenance efficiency. The intent is not to create a situation where AMO maintenance staff stop seeking direction from AEO staff on serviceability criteria in situations when awaiting direction would not create these effects. **The AMO's ability to decide serviceability criteria should not be abused.**

Feedback to AEOs

32. AMOs who discover problems with existing AEO-published serviceability criteria, or would like an AEO to document new criteria, should advise the relevant AEO through the

⁴ Either inside or outside the AMO.

⁵ This is the principle of self-assessed competence.

normal PIRR process. Ideally, this engagement should occur in a considered manner without putting the AEO under adverse time pressures.

Conclusion

33. As described in this Position Paper, AMO maintenance staff may in certain scenarios, and within defined constraints, decide serviceability criteria. They do not need to be individually authorised.

34. People may provide engineering advice to these AMO decision-makers without any need to be individually authorised. There is no concept of being individually authorised to give engineering advice on serviceability criteria.

35. During 2008, the content of this Position Paper will be published in the AAP 7001.053 after issue of a Notice of Proposed Rule Making and consideration of the responses. In the interim, if there is a need to clarify or amplify parts of this TAR Position Paper, revisions will be issued.



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