



## **TAR POSITION PAPER 3/2008**

### **AMPLIFYING, CLARIFYING AND CREATING MAINTENANCE PROCEDURES**

#### **Introduction**

1. Maintenance procedures for aircraft and Aeronautical Product (AP) are documented in both aircraft/AP-specific and generic maintenance manuals. These manuals are written by numerous organisations applying a broad range of philosophies as to the level of detail required. At one end of this range, maintenance procedures are broken down into very detailed steps, with few assumptions about the technical competence of the maintenance workforce. At the other end of the range, maintenance manuals provide only broad direction and rely on a technically competent maintenance workforce to fill in the gaps.
2. Since the ADF uses a wide range of manuals, maintainers have historically been given discretion to amplify or clarify maintenance procedures. This allows time-efficient maintenance without the need for continual recourse to the engineering organisations that authorise the maintenance manuals.
3. This sensible position is reflected in AMO Regulation 5.1.4.e which allows an SMM to authorise a local procedure to amplify or clarify AEO-authorised maintenance procedures.
4. A number of recent events have led maintainers to question the extent to which they can amplify or clarify AEO-authorised maintenance procedures. There is also doubt about the extent to which maintainers can create maintenance procedures.
5. The existing TAMM guidance on this matter, in Section 4 Chapter 2, does not adequately describe the extent to which the maintenance workforce can amplify or clarify. To reduce maintainer uncertainty, there is a need for improved guidance.

#### **Purpose**

6. The purpose of this Position Paper is to explain the extent that AMO maintainers<sup>1</sup> can:
  - a. amplify or clarify existing AEO-authorised maintenance procedures; and
  - b. create new maintenance procedures.

#### **What are maintenance procedures?**

7. Maintenance procedures are part of the Instructions for Continuing Airworthiness for an aircraft or AP. They are normally provided by the relevant AEO, after the procedures have been processed through the Design Acceptance process. They must be distinguished from maintenance management procedures, which are the means by which an AMO describes how

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<sup>1</sup> In the rest of this Position Paper, a reference to a 'maintainer' refers to a maintainer working within an AMO.

it intends to manage its maintenance activities. For instance, a procedure describing the removal of a component from an aircraft is a maintenance procedure. A procedure that describes the method of authorising a tradesman to remove the component is a maintenance management procedure.

8. Only maintenance procedures are subject to Regulation 5.1.4 and this Position Paper. AMOs can create and amend maintenance management procedures without reference to the relevant AEO.

### **‘Amplify or clarify’ vs ‘create’**

9. The term ‘amplify or clarify’ in Regulation 5.1.4e implies there is a difference between amplification and clarification. For the purposes of this Position Paper, there is no value in attempting to differentiate between them.

10. Amplifying or clarifying a maintenance procedure requires that an AEO-authorized maintenance procedure exists to achieve the desired maintenance outcome. The maintainer seeks to vary part of the procedure.

11. The creation of a maintenance procedure by a maintainer usually implies that no AEO-authorized maintenance procedure exists to achieve the desired maintenance outcome. A maintenance procedure can also be created, in specific circumstances, when there is an extant procedure, but the maintainer has good reasons to create an alternative procedure.<sup>2</sup>

### **Characterising maintenance procedures**

12. The ability for maintainers to amplify, clarify or create maintenance procedures depends on the type of maintenance procedure. For the purposes of this Position Paper, maintenance procedures are characterised by the extent that they:

- a. describe serviceability criteria;
- b. contain quantitative criteria that do not form part of serviceability criteria (torques, pressures, dimensions);<sup>3</sup>
- c. provide a sequence of specific steps required to complete the maintenance activity;
- d. relate to safety-critical systems or non safety-critical systems;
- e. require inspections or disassembly/assembly;
- f. pose OH&S hazards to maintainers,
- g. prescribe zonal/system cautions and warnings,

<sup>2</sup> In this latter case, there is potential for overlap with an amplified/clarified procedure.

<sup>3</sup> Serviceability criteria can include quantitative criteria. Usually a measurement is taken and compared to benchmark criteria to determine serviceability. Other maintenance procedures can include quantitative criteria without any requirement to determine serviceability.

- h. detail the use of tooling and GSE; and
- i. detail the use of POL and other consumables.

### **Amplifying or clarifying maintenance procedures**

13. Each of the characteristics in paragraph 12 will be discussed and direction provided on the extent to which the part of the maintenance procedure exhibiting this characteristic can be amplified or clarified. Some of these characteristics are also relevant, as discussed later in this Position Paper, to the extent that maintainers can create maintenance procedures.

#### **Serviceability criteria**

14. The ability of maintainers to amplify and clarify serviceability criteria was described in TAR Position Paper 1/2007.

#### **Quantitative criteria**

15. Maintainers are not able to amplify or clarify quantitative criteria, or their units of measure, in any maintenance procedure. Such clarification or amplification is to be sought from the relevant AEO.

#### **Sequence of steps**

16. Any maintenance procedure contains a series of sequenced steps. Maintenance procedures may be amplified or clarified by:

- a. inserting steps:
  - (i) between existing steps;
  - (ii) before the first documented step, where the new step(s) is necessary in order to perform the maintenance procedure; and
  - (iii) after the last documented step, where the new step(s) are necessary in order to complete the maintenance procedure.
- b. not performing existing steps which are clearly not applicable to the maintenance task being performed.

17. Distinction must be made between the sequence of steps in a maintenance procedure and a sequence of maintenance procedures. Whilst there should be some safety-based rationale for the former sequence, there is often no rationale for the latter. For example, a flight servicing schedule contains a sequence of maintenance procedures, some of which are not associated. The publication may imply that a maintainer should examine aircraft brakes before checking cockpit switches, but performing these steps in the reverse sequence would have no impact on aircraft safety.<sup>4</sup> Maintainers can vary the sequence of maintenance procedures. In contrast, the sequence of steps required to remove and reinstall a component are critical. Thus within a maintenance procedure, amplifying and clarifying does not include

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<sup>4</sup> Although the steps may be sequenced for ergonomic/time-efficiency reasons.

amending existing steps or the sequence in which the existing steps are to be performed relative to each other.

18. The distinction between the sequence of logical steps within a maintenance procedure and the sequencing of maintenance procedures for efficiency can be blurred. Maintainers are to exercise their professional judgement in making such distinctions.

19. Further, maintainers can only add additional steps to a maintenance procedure when:

- a. such steps only require the techniques/skills required of appropriately task-authorised maintainers; and
- b. the maintainer has available the tooling/GSE/POL and other consumables required to perform the step.

### **Safety-criticality of system**

20. Maintainers are able to amplify or clarify maintenance procedures for both safety-critical and non-safety critical systems, as defined by the relevant AEO. Maintainers will have less discretion to create maintenance procedures for safety-critical systems, as discussed later in this Position Paper.

### **Inspections vs disassembly/assembly**

21. Some maintenance procedures require disassembly of a system, to varying degrees, whilst other procedures simply inspect systems without disassembly. Some maintenance inspections contain explicit serviceability criteria whilst others do not. Maintainers can amplify or clarify maintenance procedures that both inspect or disassemble/assemble systems. Importantly, inspections that include serviceability criteria are subject to the requirements of paragraph 14 above. As discussed later in this Position Paper, maintainers have greater discretion to create maintenance inspections than procedures requiring disassembly/assembly.

### **Occupational Health and Safety**

22. In creating, amplifying or clarifying maintenance procedures, AEOs are required to consider their impact on the Occupational Health and Safety (OH&S) of maintainers. In creating, amplifying and clarifying maintenance procedures, maintainers are also to consider OH&S impacts.

### **Zonal/system cautions and warnings**

23. In creating, amplifying or clarifying maintenance procedures, maintainers are required to consider the relevance of any zonal/system cautions and warnings.

### **Tooling and GSE**

24. Where an AEO-authorized maintenance procedure specifies tooling or GSE generically, then maintainers can choose to use an appropriate product that fits within the generic description. If the procedure requires the use of a 'lifting sling' then the AMO maintainer is to exercise judgement in choosing a lifting sling suitable for the component being lifted. Where

an AEO-authorized maintenance procedure specifies tooling or GSE by part number, maintainers have no discretion to use other products without reference to the relevant AEO.<sup>5</sup>

### **POL and other consumables**

25. Where an AEO-authorized maintenance procedure specifies POL or other consumables by part number, maintainers have no discretion to use other products without reference to the relevant AEO. Where the procedure specifies these products generically, then maintainers can choose to use an appropriate product that fits within the generic description.

### **To what extent can maintainers create enduring maintenance procedures?**

26. When does amplification/clarification of an AEO-authorized maintenance procedure cross the line and lead to the creation of a new procedure? Is a maintainer able to create a new procedure at all? Maintainers can create new maintenance procedures only in the scenarios described in the following paragraphs.

#### **Scenario 1**

27. A maintainer needs to maintain component X for which there is no specific documented maintenance procedure. Nevertheless, generic maintenance manuals exist for the class of components containing component X.

28. The maintainer is able to create a specific maintenance procedure for component X provided that this maintenance procedure falls entirely within the bounds of the allowable procedures in the generic manual. For example, a maintainer may develop a specific repair procedure for a structural defect if the type of defect is identified in the relevant structural repair manual and a generic repair scheme is detailed.

#### **Scenario 2**

29. A maintainer intends to perform an AEO-authorized maintenance procedure on component X. In order to gain access to component X, the maintainer needs to temporarily remove component Y. There is no AEO-authorized removal/installation process for component Y.

30. The creation of a removal/installation procedure for component Y could be considered the creation of a new maintenance procedure. The regulatory position is that this situation falls within the discretion of AMOs to create new steps before an existing AEO-authorized maintenance procedure, when those steps are necessary to perform the authorized procedure. The critical consideration is whether Component Y is part of an AEO-specified safety critical system. If so, the AMO can only perform the removal/installation if the AEO has provided an authorized procedure for confirming the serviceability of the safety critical system after it has been disturbed by the removal and reinstallation of component Y. If the system is not safety critical, maintainers can exercise their professional judgement in deciding the steps for confirming serviceability.

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<sup>5</sup> Maintainers should read the investigation report into the 1979 crash of American Airlines Flight 191 to understand the severe risks when maintenance organisations select alternative GSE.

### Scenario 3

31. During a zonal inspection a defect is detected in component X. There is no specific AEO-authorized maintenance procedure for the removal/installation of component X.
32. Maintainers can remove unserviceable components, without reference to the AEO, in defined circumstances. For components in AEO-specified safety critical systems, the caveat discussed in scenario 2 applies. The AMO can only perform the removal/installation if the AEO has provided an authorized procedure for confirming the serviceability of the disturbed safety critical system.
33. In these scenarios, the caveats discussed at paragraphs 16 through 19 apply to the ability of the maintainer to create steps in any maintenance procedure.

### Scenario 4

34. A maintainer wants to create a maintenance inspection that does not require the component to be disassembled or reassembled.
35. A maintainer may create a maintenance inspection, at any time, for the purposes of highlighting a potential unserviceability. The maintainer may not create a maintenance inspection containing serviceability criteria, except as allowed in TAR Position Paper 1/2007.

### Special situations

36. There are three special situations in which maintainers have greater scope to amplify, clarify or create maintenance procedures. They are:
- a. compelling emergency or contingency situations as explained in DI(G) OPS 2-2 paragraph 40;
  - b. when maintenance procedures are amplified, clarified or created as part of risk treatments authorized under a Carried Forward Unserviceability; and
  - c. during the exercise of Contingency Maintenance (CMAINT) or Aircraft Battle Damage Repair (ABDR) as described in Regulation 5.1.20.

### Compelling emergency or contingency situations

37. In compelling emergency or contingency circumstances, maintainers can create, amplify or clarify maintenance procedures without the regulatory constraints described earlier in this Position Paper. The AMO must be prepared to justify such actions to the TAA after the return to normal operations.

### CFUs

38. The decision to carry forward an unserviceability is often accompanied by a decision to introduce some targeted maintenance procedure to reduce the risk posed by the CFU. Maintainers can create new maintenance procedures, or amplify/clarify existing maintenance procedures, in this situation without the regulatory constraints described earlier in this Position Paper. The maintenance procedure would need to be agreed by the CFU authority as

part of the total CFU decision. Such decisions could be subject to review by the AEO or TAA.

### **CMAINT and ABDR**

39. Regulation 5.1.20 allows maintainers to exercise CMAINT and ABDR procedures approved by the relevant AEO. These AEO-approved procedures may provide maintainers with discretion to amplify, clarify and create maintenance procedures. In this situation, maintainers would not be subject to the regulatory constraints described earlier in this Position Paper.

#### **Time-criticality of decisions**

40. In exercising their ability to create, amplify or clarify any maintenance procedure, maintainers should be cognisant of the time-criticality of the decision. Maintainers should only create, amplify or clarify maintenance procedures in situations where not to do so would markedly reduce aircraft availability or maintenance efficiency.

#### **Self-assessed competence**

41. Although maintainers have a restricted ability to create, amplify or clarify maintenance procedures, they should not do so where they believe such action would be outside their self-assessed level of competence. They are to take particular care in exercising their ability to create, amplify or clarify maintenance procedures on AEO-specified safety critical systems.

#### **Documentation of maintenance activities**

42. Nothing in this Position Paper removes the requirement for maintainers to properly document and certify maintenance activities performed on aircraft or AP.

#### **Who can /amplify/clarify/create within an AMO?**

43. Regulation 5.1.4e only authorises SMMs to amplify or clarify maintenance procedures. Taken literally this requirement would require constant referral of decisions to the SMM that would overload the maintenance management system. This Regulation is to be interpreted as requiring the SMM to document, as a **maintenance management procedure**, the system to be applied within the AMO to create, amplify or clarify maintenance procedures. The maintenance management procedure is to:

- a. specify who in the AMO can amplify, clarify and create specific types of maintenance procedures;
- b. include all the constraints and considerations discussed in this Position Paper;
- c. explain what 'time criticality' means in the context of that AMO; and
- d. describe the method to be used in documenting approvals.

**Advice to AEOs**

44. The TAMM requires that the AMO shall report to the relevant AEO any deficiencies in authorised maintenance procedures. Thus AMOs are to advise the relevant AEO of:
- a. regular creation, amplification and clarification that should be documented by the AEO in the relevant maintenance manual, and
  - b. any creation, amplification or clarification of maintenance procedures for safety-critical systems.

**Conclusion**

45. This Position Paper explains the ability of maintainers to amplify, clarify and create maintenance procedures. AMOs are to apply the guidance in this Position Paper rather than the current TAMM guidance at Section 4 Chapter 2. The TAMM will be amended to reflect the content of this Position Paper. If there is a need to clarify parts of this TAR Position Paper, revisions will be issued.



**D.E. TINDAL**  
AIRCDRE  
DGTA-ADF  
ADF Technical Airworthiness Regulator

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