





#### PUTTING THE ENGINEER BACK IN AEROSPACE ENGINEER: INCREASING THE SENIOR MAINTENANCE MANAGER'S SCOPE OF AUTHORITY

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# JCSP 46

## **Service Paper**

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# **PCEMI 46**

# Étude militaire

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#### CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES

JCSP 46 – PCEMI 46 2019 – 2020

#### SERVICE PAPER - ÉTUDE MILITAIRE

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Word Count: 2,326

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Nombre de mots : 2.326

#### PUTTING THE ENGINEER BACK IN AEROSPACE ENGINEER: INCREASING THE SENIOR MAINTENANCE MANAGER'S SCOPE OF AUTHORITY

#### AIM

1. The aim of this service paper is to advocate to the Technical Airworthiness Authority (TAA) and the Director of A4 Maintenance in 1 Canadian Air Division (CAD) that there is a need to increase the Senior Maintenance Manager's (SMM) scope of authority to conduct limited technical airworthiness activities. The scope of authority granted to a SMM should be based on their knowledge, skills and experience.

#### INTRODUCTION

2. The TAA is responsible for all aspects of the Technical Airworthiness Program (TAP) in the Canadian Armed Forces (CAF).<sup>1</sup> In every aircraft maintenance organization, the TAA designates a SMM to be the person responsible for the airworthiness related activities in that organization.<sup>2</sup>

3. Although there are exceptions, the senior Aerospace Engineering (AERE) officer in the maintenance organization is designated the SMM.<sup>3</sup> Many of these AERE officers have experience working in an acceptable technical organization (ATO) or acceptable design organization (ADO) as the Senior Design Engineer (SDE), an Authorized Individual (AI) or a Finding Authority (FA) and years of working in a maintenance and engineering environment. Despite their knowledge, skills and experience when they are designated SMM they are given very little authority to make engineering and maintenance decisions. Often times relatively simple maintenance and engineering decisions, which do not adversely affect airworthiness, need to be staffed and approved by an AI in an ATO. The Department of National Defence (DND) should be taking advantage of the knowledge, skills and experience that SMMs possess and should allow them to conduct limited technical airworthiness activities when there is no adverse impact on airworthiness.

4. In this service paper a proposed increased scope of authority for SMMs will be presented along with the potential benefits that would result. Finally, a brief discussion of additional training requirements that may be required by SMMs if there was an increase in their scope of authority will be presented.

<sup>&</sup>lt;sup>1</sup> Department of National Defence, C-05-005-001/AG-001, *Technical Airworthiness Manual* (Ottawa: DND Canada, 2019), 1-1-1-2.

<sup>&</sup>lt;sup>2</sup> *Ibid.*, 1-4-1-6.

<sup>&</sup>lt;sup>3</sup> Department of National Defence, C-05-005-P03/AM-001, *CF Maintenance Activity Authorizations and Training Standards* (Winnipeg: DND Canada, 2018), 1-2.

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#### DISCUSSION

#### **Recommended Scope of Authority**

5. The list of SMM responsibilities can be found in the Canadian Armed Forces (CAF) Maintenance Process Manual (MPM). With the exception of imposing operational restrictions and advancing inspections there is very little authority to exercise engineering or maintenance judgement.<sup>4</sup> This seriously reduces the effective utilization of the SMM.

6. Delegating authority to conduct limited technical airworthiness activities to AERE officers in a maintenance organization is not foreign to the CAF. The current MPM allows specific deviations to the maintenance program to be approved by maintenance officers and is known as Devolved Engineering Authority (DEA).<sup>5</sup> DEA is, however, not linked to being a SMM and is authorized by the SDE not the TAA. There are very specific restrictions on the use of DEA listed in the MPM. For example, it cannot be applied to critical systems.<sup>6</sup> It does, however, provide the authorized individual with a level of flexibility to make decisions and maximize aircraft availability without seeking higher headquarters approval.

7. A SMM that has previous experience as a SDE, an AI or a FA should be considered for a greater scope of authority. All SMMs should be considered for DEA when they are designated SMM and the restrictions that currently apply to the use of DEA could be relaxed on a case-by-case basis depending on the SMM's background.

8. If a fleet is using a TAA approved Master Minimum Equipment List (MMEL) SMMs should be authorized, without requesting authority from the ATO,<sup>7</sup> to extend the repair time of Category D items if they are considered optional equipment (i.e. mission kit) and meet the following requirements from TAA Advisory 2013-7:

- a. the absence of the item cannot adversely affect the crew members' workload;
- b. the crew members do not rely on the function of that item on a routine or continuous basis; and
- c. the crew members' training, subsequent habit patterns and procedures do not rely on the use of that item.<sup>8</sup>

9. Finally, in straightforward situations, SMMs should be able to interpret the maintenance instructions and provide clarification as opposed to seeking clarification and

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<sup>&</sup>lt;sup>4</sup> Department of National Defence, C-05-005-P03/AM-001, *CF Maintenance Activity Authorizations and Training Standards* (Ottawa: DND Canada, 2018), 1-25.

<sup>&</sup>lt;sup>5</sup> Department of National Defence, C-05-005-P09/AM-001, *Maintenance Program Implementation – Support Activities* (Ottawa: DND Canada, 2019), 9-10.

<sup>&</sup>lt;sup>6</sup> *Ibid.*, 9-10.

<sup>&</sup>lt;sup>7</sup> *Ibid.*, 9-14.

<sup>&</sup>lt;sup>8</sup> Department of National Defence, Technical Airworthiness Authority Advisory 2013-7, *Development of an Initial Master Minimum Equipment List* (Ottawa: DND Canada, 2017), 4.

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approval from the ATO. In this case, the SMM would also be responsible for ensuring that the appropriate paperwork is staffed (i.e. Technical Problem, Unsatisfactory Condition Report, etc.) to have the maintenance instruction clarified. It could be argued that SMMs already have this authority;<sup>9</sup> however, there is a culture in the CAF that everything must be done in accordance with the approved technical manuals and any deviation, no matter how minor, must be approved by the ATO.

10. The SMM's primary responsibility is to ensure that the organization remains compliant with the MPM and that the organization has a healthy airworthiness culture. This must remain their number one priority. As such, if SMMs were granted the authority to conduct the limited technical airworthiness activities discussed above, they would have to ensure it did not adversely impact airworthiness.

11. Each decision made by the SMM to deviate from the approved maintenance program would need to be substantiated with an airworthiness impact assessment. If the SMM's decision to exercise these authorities would increase the risk of the aircraft above an acceptable level of safety or if they did not have the information to demonstrate that it would not increase risk of the aircraft above an acceptable level of safety, then SMM would not be authorized to exercise their authority.

12. An operational review and concurrence by one of the senior squadron operators (i.e. Squadron Operations Officer) would be required for all decisions that could affect or be visible to operators.<sup>10</sup>

13. Unlike DEA, where every decision needs to be forwarded to the SDE for review, SMMs would not need to forward their decisions to anyone for review. They would be responsible and held accountable for ensuring they remain within their scope of authority and meet all higher level policy requirements.

14. Finally, unit procedures would have to describe how all decisions would be recorded, logged and become part of the aircraft's permanent technical record. These records would be audited by the Aircraft Maintenance Standards and Evaluation Team and the Directorate of Technical Airworthiness and Engineering Support (DTAES) to ensure the decisions were within the scope of the SMM.

#### Benefits of Increasing the SMM's Scope of Authority

15. Various command models support pushing responsibility down to the appropriate level. The Competency, Authority and Responsibility (CAR) model as developed by Pigeau and McCann emphasizes balancing authority and responsibility against an

<sup>&</sup>lt;sup>9</sup> Department of National Defence, C-05-005-P03/AM-001, *CF Maintenance Activity Authorizations and Training Standards* (Ottawa: DND Canada, 2018), 1-25.

<sup>&</sup>lt;sup>10</sup> Department of National Defence, EMT04.054, *Deviations from the Approve Maintenance Program* (Ottawa: DND Canada, 2018), 7.

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individual's competence.<sup>11</sup> This model would suggest that based on the SMM's competence they should be given an equivalent amount of authority and responsibility. The Alberts-Hayes model of Power to the Edge, emphasizes empowering individuals in the organization where they interact with the operating environment.<sup>12</sup> The benefits of authorizing the SMM to conduct specific technical airworthiness activities would be immediate. When some decisions need to be made within the ATO, the individuals in the ATO are unfamiliar with the situation, have less information than the SMM and may have little hands-on experience with the aircraft. In cases where detailed engineering knowledge is not required to make a decision, the SMM may be in a better place to make the decision than an authorized individual in the ATO.

16. It is not unusual for SMMs to have previously been a SDE, AI or FA. Therefore, they have already demonstrated that they have the knowledge, skills and experience to make decisions related to technical airworthiness activities. A SMM will not have the same access to engineering data or subject matter experts, as they would in and ATO or ADO, and therefore will not be able to make some decisions, but their past experience should inform them as to whether they have the information required to make a decision.

17. Individuals that work in an ATO are normally very busy working on contracts and/or fleet issues. When they are required to address individual aircraft issues that could be solved at the SMM level, it takes them away from carrying out work to fix fleet issues. Normally when an aircraft is unserviceable and requires a deviation to the approved maintenance program it can become a top priority within the ATO to resolve. This, however, can detract their attention from other activities which have wider and longer term impact on the fleet. Additionally, for fleets with contracted in-service support, these deviation request are often sent to the contractor for review, which also takes away their time from working on more important fleet issues. In all, a 'straightforward' deviation from the approved maintenance program can consume dozens of working hours from many organizations and individuals when their time can be spent working on more important issues.

18. Exercising technical airworthiness processes, such as approving a deviation to the approved maintenance program, can be burdensome and time-consuming. The timelines increase significantly with the more organizations that need to be involved. This is often necessary to ensure the levels of safety associated with aviation are maintained. There are, however, many situations where the solutions are straightforward, but the approval authority is not at the appropriate level. If SMMs were authorized to conduct limited technical airworthiness activities the occupation would gain credibility as SMMs would be seen as contributing to the operation and not just administering a process.

19. In general, deviations to the approved maintenance program will not be approved if they increase the risk of the aircraft above an acceptable level of safety. However, there

<sup>&</sup>lt;sup>11</sup> Ross Pigeau, Carol McCann. Re-conceptualizing Command and Control. *Canadian Military Journal* (Spring 2002): 53-64.

<sup>&</sup>lt;sup>12</sup> David S.Alberts and Richard E Hayes, *Power to the Edge: Command, Control in the Information Age* (n.p.: 2005), 5.

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are cases where aircraft may be approved to operate at a higher level of risk if accepted by the applicable Command Authority.<sup>13</sup> Accepting greater risk for continued aircraft operations fall into two categories:

- a. Deviations by technical airworthiness authorized individuals; and
- b. Deviations for operational necessity.<sup>14</sup>

20. Canadian Air Division Order (CADO) 3-710 discusses how to obtain approval to deviation from the maintenance program for reasons of operational necessity. IAW CADO 3-710:

A mission can be qualified as "Operational Necessity" when, during war or peacetime operations, the consequences of not carrying out a mission justify the acceptance of an airworthiness risk without having had the opportunity to fully assess and mitigate a hazard condition. Examples of situations in which operational necessity could apply are:

1. Emergency as defined in the National Defence Act (war, invasions, riots, or insurrection, real or perceived);

2. Protection of lives – search and rescue (SAR), disaster relief and medical evacuation; and

3. Situations deemed essential to the defence of Canada.<sup>15</sup>

21. Operational Command Risk Acceptance for operational necessity falls to the following personnel:

a. Commander 1 CAD for operations that fall under responsibilities of the Commander Canadian North American Aerospace Defence (NORAD) region and Canadian Forces Air Component Commander;<sup>16</sup>

b. Wing Commanders if Commander 1 CAD or Deputy Commander Force Generation cannot be reached for all critical Search and Rescue (SAR) Operations;<sup>17</sup> and

c. Deployed Air Wing Commanders, or their delegates, if assigned in the Operation Order for deployed operations.<sup>18</sup>

22. Deviations from the approved maintenance program for operational necessity normally imply the acceptance of greater risk due to their nature.<sup>19</sup> If time allows, an

<sup>&</sup>lt;sup>13</sup> Department of National Defence, 1 Cdn Air Div Orders Vol 3 3-710, *Authority to Approve Deviations from an Approved Maintenance Program* (Winnipeg: 1 CAD, 2011), 2.

<sup>&</sup>lt;sup>14</sup>*Ibid.*, 2.

<sup>&</sup>lt;sup>15</sup> *Ibid.*, 2.

<sup>&</sup>lt;sup>16</sup> *Ibid.*, 3.

<sup>&</sup>lt;sup>17</sup> *Ibid.*, 3.

<sup>&</sup>lt;sup>18</sup> *Ibid.*, 3.

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airworthiness impact assessment shall be conducted by the ATO and the Operational airworthiness staff which will be presented to the Command Risk Acceptance Authority who weigh the risk of not carrying out the mission against the airworthiness risk.<sup>20</sup>

23. In times of extreme urgency, when there is time limitation, which preclude the engagement of the ATO and the operational airworthiness staff, the SMM and Operations Officer will brief the relevant technical and operational airworthiness issues directly to the Operational Risk Acceptance Authority.<sup>21</sup> Therefore, there are situations, particularly critical SAR or while deployed, where the SMM may be required to effectively assess the technical airworthiness risk associated with deviating from the approved maintenance program.

24. If AEREs are going to train the way they fight, they should be regularly assessing the technical risks associated with deviations from the approved maintenance program to refine these skills. Authorizing SMMs to carry out limited technical airworthiness activities will force them to regularly assess technical risk and better prepare them for situations where they may have to advise an Operational Risk Acceptance Authority.

25. There will be concerns that SMMs, due to the pressure of producing aircraft, may make a wrong decision that leads to an incident or accident. Although this risk can never be eliminated, if measures are put in place to ensure that the scope of authority is balanced against the individual's knowledge, skill and experience then the organization has to trust that individuals will take responsibility for their authority and make ethical and airworthy decisions.

## Impact of Changing the Scope on Training Requirements

26. There are SMMs that have never worked in the Division of Aerospace Engineering Program Management (DAEPM) and therefore have potentially never taken training or gained experience in airworthiness, risk management, maintenance program development, and aircraft certification. It would therefore potentially be unwise to expand upon the current scope of authority that an SMM has for these individuals; the one exception to this may be authorizing them with DEA as currently described in the MPM.

27. If implemented, there may be a need to increase training opportunities for SMMs to attend some of the courses provided by the DAEPM, particularly those run by the DTAES staff. If, however, most of the SMMs have experience in DAEPM this training bill may not prove to be very high. Additionally, the expanded scope and its associated responsibilities could be a focus of the Aircraft Maintenance and Engineering Officer course run by the Canadian Forces School of Aerospace Technology and Engineering.

<sup>&</sup>lt;sup>19</sup> *Ibid.*, 3.

 <sup>&</sup>lt;sup>20</sup> Department of National Defence, 1 Cdn Air Div Orders Vol 3 3-710, Authority to Approve Deviations from an Approved Maintenance Program (Winnipeg: 1 CAD, 2011), 3.
<sup>21</sup> Ibid., 3.

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#### CONCLUSION

28. The current scope of authority for SMMs does not take into account their knowledge, skills and experience.

29. If the scope of authority of SMM's was matched to their respective skills, knowledge and experience, there would not be an adverse impact on airworthiness.

30. Increasing the scope of SMMs to conduct limited technical airworthiness activities would have the following benefits:

- a. reducing aircraft downtime for minor issues without adversely impacting airworthiness by placing decisions at the appropriate level;
- b. reducing the workload of the Acceptable Technical Organization (ATO), allowing it to focus on more important issues affecting the fleet;
- c. increasing the overall engineering competence and credibility of the AERE occupation; and
- d. allowing AEREs to train the way they fight.

31. Additional training may be required for SMMs that have never worked in DAEPM in order to ensure they have the knowledge, skills and experience to increase their scope of authority.

## RECOMMENDATION

32. The SMM's scope of authority should be increased to reflect their skills, knowledge and experience. The scope of authority could be expanded to include:

- a. DEA with potentially less restrictions than currently imposed by the MPM;
- b. extending the time to repair of Category D items on the MMEL without approval from the ATO; and
- c. interpreting the maintenance instructions.

33. A working group, with subject matter experts from 1 CAD/A4 Maintenance, DTAES, and members from various fleets should be put together to determine the SMM's scope of authority and any additional training requirements that may be required.

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