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ROYAL CANADIAN AIR FORCE
DIVISION OF
AIR MEMBER FOR TECHNICAL SERVICES

DEVELOPMENT STUDY

REPORT DAEng-46

ENGINE DEVELOPMENT MOCK-UP APPROVAL

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ENGINE DEVELOPMENT MOCK-UP APPROVAL

SUMMARY

1 Engine development programs which are undertaken by contractors on behalf of the RCAF, require RCAF approval of the mock-up. Such programs may affect new engines, new marks of existing engines or reheated versions of existing engines.

2 This report sets forth the policy and procedure to be followed by an engine development Mock-up Board.

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ENGINE DEVELOPMENT MOCK-UP APPROVALI INTRODUCTION

1 Engine development programs which are undertaken by contractors on behalf of the RCAF, require RCAF approval of the mock-up. Such approval is the basis on which the prototype can be prepared, and on which subsequent production can be modelled.

2 Development programs which require mock-up approval include:

(a) New engines procured under the following specifications:

MIL-E-5007A Engines; Aircraft Turbo-Set, General Specification for

MIL-E-5036 (Aer) Engines; General Specification for Aircraft Liquid Propellant Rocket

MIL-R-5149 (USAF) Rockets; General Specification for Aircraft Liquid Propellant

MIL-E-8593 (ASG) Engines; General Specification for Aircraft Turbo-Prop

MIL-E-25109 Engines; General Specification for Aircraft Reciprocating

(b) New marks of existing engines

(c) Augmented versions of existing engines.

3 This report outlines the procedure which governs the assessment of any mock-up as described above. Each mock-up will be inspected and assessed by a Mock-up Board. The action of the Mock-up Board is subject to review and approval by AMTS/CAE on behalf of the CAS. The object of this evaluation is to assess the mock-up for operational, maintenance and design requirements.

II DEFINITIONS

4 Mock-Up An engine mock-up is a full scale representation of the engine or part thereof to be inspected. Preliminary mock-ups may be constructed of wood, plastic materials, or actual components and items of engine as described in the Model Specification.

(a) Preliminary Mock-Up A preliminary mock-up as described above, is required when more than one control system or configuration is proposed by the manufacturer.

- (b) Final Mock-Up A final mock-up shall be constructed of steel or actual components and items of the engine as described in the Model Specification and shown on installation drawings.

III THE MOCK-UP BOARD

5 Composition The Mock-up Board is to be convened by AMTS/DAEng on behalf of the CAS. It is composed of members and technical advisors representing the following formations:

(a) Members:

- (i) AMTS/DAEng (Chairman)
 - (ii) VCAS/DADR
 - (iii) VCAS/DAO (if required)
 - (iv) VCAS/DFO (if required)
 - (v) VCAS/DAT (if required)
 - (vi) AMTS/DMEng
 - (vii) AMTS/DIEEng (if required)
 - (viii) AMCHQ
 - (ix) User Command(s)
 - (x) OC TSD (RCAF Technical Representative)
 - (xi) AMTS/DAEng Project Engineer (Secretary)
- (b) Technical advisors as required - officers and/or NCOs who are operational or engineering specialists on the relevant equipment, from AFHQ, AMCHQ, IAM, and user commands and units, also representatives of the Department of Defence Production and Defence Research Board.
- (c) Observers as desired - personnel of other agencies outside the RCAF. This includes representatives from airframe manufacturers invited by the RCAF; also representatives, other than the Board member of other Services (RCN, RCAF, DRB, etc.). Other Services desiring additional representation from Industry will submit their request to the RCAF.

6

Responsibilities

- (a) Determine compliance with the engine specification and that all accessories, fluid lines or other equipment are mounted and located satisfactorily for installation in an aircraft.
- (b) Determine that operational, maintenance and safety requirements are met in accordance with the applicable standards and design criteria as specified

in CAP 479 and/or ADRCM 80-1.

- (c) Determine necessary changes for operational effectiveness, safety, ease of maintenance, and logistic support.
- (d) Recommend to the RCAF necessary changes in the design which should be effected before fabrication of the prototype or production models.

IV THE APPROVAL PROCEDURE

7 Timing Approximately thirty (30) days before the mock-up will be ready for inspection by the Mock-up Board, the RCAF representative at the contractor's plant will inform AFHQ. The mock-up inspection should be held as early as practicable after all design and/or installation features have been established by the manufacturer in order that necessary changes may be made without delaying previously established fabrication schedules. A date will be set by the Development Co-ordinating Committee which will be mutually suitable to the RCAF and to the contractor. The Co-ordinating Committee chairman will immediately advise all parties concerned of the date, nature and extent of the inspection.

8 At least 7 days prior to the mock-up inspection the Co-ordinating Committee chairman will notify the contractor of the names and security clearance of the chairman, secretary, Mock-up Board members, technical advisors, and observers.

9 Preparation The RCAF representative at the contractor's plant will be responsible that:

- (a) The mock-up is complete and ready for inspection at the time of arrival of the Mock-up Board.
- (b) Aircraft accessory mock-ups are provided in accordance with the applicable clearance envelopes.
- (c) All pertinent accessories, fittings and sections of the engine are labelled.
- (d) A routine schedule is arranged that will avoid congestion of inspection personnel in any particular area of the mock-up.
- (e) Sufficient contractor's service personnel are available to provide extension lights if necessary, and to rearrange, modify or rework various items of the mock-up if the Board so requests.

- (f) The contractor provides engineering assistance as required, including project, design and production engineering personnel for consultation, also such layout drawings as the Board members and/or technical advisors may desire. A simple brochure of the engine installation features is prepared and copies available for inspecting personnel.
- (g) Typing facilities are available; and that adequate chairs and tables are provided both in the inspection area and in the conference room.
- (h) The inspection area and conference room are located in quiet areas within a building, and the inspection area is segregated or roped off to prevent trespassing and interruptions by unauthorized personnel. It is desirable that the mock-up and Board room be located in the same room or area.
- (j) The necessary reservations for accommodations are made, and that local transportation is provided for inspection personnel.

10 Chairman's Briefing On the date selected, the Mock-up Board will assemble at the specified place to hold an initial meeting to discuss all details of the inspection before viewing the mock-up. The engine contractor will be called upon by the chairman to give a brief description of the engine, its background, performance, and production schedule, and to explain the installation features of the engine at the beginning of the meeting. Copies of the Model Specification for the engine shall be available during this presentation.

11 The chairman, or a representative appointed by him, will explain the scope of the inspection which will include the history of the project, the specifications applicable, any new requirements which have become applicable since the letting of the contract, etc. The chairman will explain the time, cost and logistic factors which may be involved in changes which may be desired. The chairman will distribute the schedule of inspection which outlines the times when the mock-up will be available to the respective members and their advisors.

12 Inspection of Mock-Up After this initial meeting, the members, technical advisors and observers will proceed to inspect the engine; each will prepare a Change Request Form (ref Appendix "A") as the necessity becomes evident to him. Only one request is to be presented on each form. The person submitting the request will be prepared to explain and substantiate his opinions with reasonable and constructive criticism and solutions for his change. A comment may be withdrawn by the initiator if another comment has covered the subject satisfactorily.

13 Observers may be allowed by the chairman to comment on the Model Specification, however, the chairman of the Board may choose not to discuss the items until the official specification coordination.

14 The Members' Conference During and after the inspection, and at the call of the chairman, the members, the contractor's personnel and such other personnel as the chairman desires, will assemble to discuss the Change Request Forms on hand, and action to be taken on alteration or studies requested.

15 Conference Decisions The decisions of the Board Members will be indicated on Change Request Forms, by the following standard categories supplemented by additional remarks (dissenting votes will be recorded).

CATEGORY I

Inspection Change: To be accomplished prior to delivery of any engine. This category will include all items on which the company have been given direction through authorized channels.

CATEGORY II

Mandatory Change: To be accomplished prior to delivery of any aircraft. This category will include all changes considered essential for the efficient operation and structural reliability of the engine.

CATEGORY III

Changes of a nature requiring a study by the contractor or the RCAF.

CATEGORY IV

Changes not acceptable.

16 Completed Change Requests The action agreed upon will be indicated on the Change Request Form by the chairman. The original will be retained by the secretary, the duplicate will be given to the RCAF representative, and the triplicate will be given to the contractor. If more space is needed for comments or recommendations, the information will be typed in triplicate on plain white bond, and attached to each copy of the form.

V THE MOCK-UP BOARD REPORT

17 Report of Proceedings The project engineer will prepare a report for submission to AMTS/CAE, and will summarize the following:

- (a) Purpose of the meeting

- (b) Date convened
- (c) Team members present
- (d) Technical advisors
- (e) Recommendations and conclusions
- (f) Attached to the report as an appendix will be a transcript of each Change Request Form, forming a part of the proceedings of the Mock-up Board.

18 Report Approval The Mock-up Board's report of the proceedings, when reviewed in conjunction with the mock-up and approved or amended by AMTS/CAE on behalf of the CAS, constitutes RCAF approval of the mock-up and gives direction to the RCAF as applicable.

VI MOCK-UP REVIEW BOARD

19 Requirement A Mock-up Review Board will not normally be convened after the engine mock-up. The engine installation in the aircraft will be inspected and assessed by the Aircraft Mock-up Board, as soon as possible after the engine mock-up in accordance with DAEng 32 Report.

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Appendix "A" to
Report DAEng-46
Dated 9 May 56

CHANGE REQUEST

Engine.....Date.....

Subject.....

Directorate or Command initiating request.....

Details of Change Desired.....

.....

Reason.....

.....

.....

State effect of change on the Model Specification and on the operation
of the engine or related components.

.....

.....

.....

Signature:.....

_____ DO NOT WRITE BELOW THIS LINE _____

Action agreed upon by Board: (Give reason if other than that stated
above)

.....

Not in agreement.....

.....Approved:.....
Board Chairman

