

AEPM-#1525167 (SEM 3-3)
10081-1 (SO Tpt Sys)
11500-82-2 / AETE 2014-025 / TOTEF 2014-010 (AFTEC 2)

5 May 2015

REQUEST FOR ESTIMATE AMENDMENT

References: A. 10081-1 (SO Tpt Rdns / SO Tpt Sys) / 11500-82-2 / AETE 2014-025 / TOTEF 2014-001 (AFTEC 2), Request for Estimate Tasking, 14 January 2015
B. System Performance Specification Addendum for Block 7.0 C-130J, C-130J-30, EC-130J, KC-130J, HC-130J, and WC-130J AIRCRAFT US01-214004-128J, 24 January 2014 (WME#410886)
C. Specification for the Canada Block 7.0 National Integration, 2 June 2014 (WME-#453369)
D. 10081-1 (SO Tpt Sys) / 11500-82-2 / AETE 2014-007 / TOTEF 2014 004 (AFTEC 2-2), Project Tasking, 20 May 2014 (AEPM-#1453986)
E. AETE 2014-007 (D/OIC AETE Det Trenton), Initial Informal Planning Estimate – AETE Support to CC130J Block 7.0 Upgrade Programme, 15 September 2014 (AEPM-#1496394)
F. 10081-2014-004 (TOTEF 4), TOTEF Project Estimate 2014-004 – Support to CC130J Block 7.0 Upgrade Programme, 27 August 2014 (AEPM-#1496395)
G. TDE Summary Report (AEPM-#1525335)
H. Developmental Test and Evaluation (DT&E) Plan for the RCAF C-130J Block 7.0 Program, 5 February 2015
I. C-05-020-007/AM-000, Flight Test Orders for the Canada Forces, 1 June 2012
J. A-GA-005-000/AG-002, AFTEC Directive, 5 August 2008
K. CC130J-30 Canada Block 7.0 Upgrade Design Change Certification Plan, (AEPM-#1329044)
L. CC130J-6CF-1, Flight Crew Checklist, Acceptance or Functional Check Flight Procedures, Tactical Transport Lockheed Martin Model 382V, Change 3, 1 March 2014
M. C130J Block 7.0 TRR IPR list, US01-113301-626AG (or latest) 20 February 2014 (WME-#419704)
N. IPO Block 7 FQT 2-2 IPR Summary Disposition, August 2013 (or later) (WME-#522465)
O. Hercules C Mk 4 and C Mk 5 Block 7.0 Upgrade – Outline Test Plan and Philosophy, 10 September 2013 (AEPM-#1405848)

PROJECT IDENTIFICATION

1. The following will identify this project:
 - a. Project Title: CC130J Block 7.0 Upgrade ET&E and OT&E Program;
 - b. Project Number: AETE 2014-025 / TOTEF 2014-010;
 - c. Project Priority: E; and

d. Security: Unclassified.

SITUATION/BACKGROUND

2. This Request for Estimate (RFE) constitutes an amendment to the original RFE for this test and evaluation (T&E) project that was tasked at reference A. Since the original RFE was tasked, there have been significant developments with the CC130J Block 7.0 Upgrade program that have resulted in a major change to the test objectives. The original RFE at reference A is thereby rescinded and replaced by this amended RFE.

3. Implementation of the RCAF CC130J Block 7.0 upgrade program is well underway. The modification is being completed by the Lockheed Martin Aeronautics Company (LM) in Marietta, GA. The RCAF CC130J Block 7.0 upgrade consists of design changes that have already been approved by the USAF (referred to as “Common Core”), and design changes that are unique to the RCAF (referred to as “Canada Unique”). A high-level summary of the RCAF CC130J Block 7.0 capabilities is provided in table at Figure 1. Full details of the Block 7.0 requirements are captured in references B and C.

Block 7.0 Common Core	
a) Previously Developed (in Block 6.1)	<i>Block 6.1 currently flown by RAF, RAAF, AMI, RDAF, and RNoAF.</i>
i. Expanded Autopilot Operation at Take-off Gross Weight	
ii. High Altitude Ramp & Cargo Door Operation	
iii. Propeller Dynamic Balancing	
iv. Waypoint Transition	
v. Ground Collision Avoidance System Mode 6 (Tactical & Normal)	
vi. Nuisance Fault Correction	
b) Newly Developed	<i>Being flight tested on USAF, RAF, and AMI TKI</i>
i. Yoke	<i>Wiring change</i>
ii. Link 16	<i>Initial capability</i>
iii. Civil GPS	<i>To get:</i>
iv. CNI-SP HW	<i>- RNAV/RNP 10, RNAV 5</i>
v. CNI-SP OFF	<i>- RNP 4, RNAV 2, RNAV 1</i>
vi. Mission Computer (MC) Operational Flight Program (OFF)	<i>- RNP 2, RNP 1, RNP 0.3 (APCH LNAV & APCH LNAV/VNAV)</i>
vii. HUD Brightness modification	
viii. Reduced Short-Field Landing	
iv. DTADS	<i>Maintenance Computer</i>
Block 7.0 Canada Unique	
i. Civil SATCOM (IRIDIUM)	
ii. ZEROIZE switch	
iii. HF SELCAL	<i>Decoder monitoring HF calls</i>

Figure 1. High-level Summary of RCAF CC130J Block 7.0 Capabilities

4. The Aerospace Engineering Test Establishment (AETE) and the Transport Operational Test and Evaluation Flight (TOTEF) were engaged at reference D to support Project Management Office Airlift Capability Project Tactical (PMO ACP-T) in

estimating and planning for the Engineering Test and Evaluation (ET&E) and Operational Test and Evaluation (OT&E). AETE and TOTEF each provided initial estimates to PMO ACP-T for planning purposes (references D and F). Following this, the ET&E and OT&E objectives for the project were confirmed by PMO ACP-T, DTAES and 1 CAD and the RFE tasking at reference A was released. As noted above, the CC130J Block 7.0 Upgrade program has progressed significantly since the RFE was originally tasked.

5. The ET&E and OT&E requirements for the CC130J Block 7.0 Upgrade are now clearly defined in this RFE. The ET&E supports certification, qualification, conformance, and provides other technical data for PMO ACP-T. From a certification perspective, the changes approved by the USAF were subject to Type Design Examination (TDE) and are not subject to further assessment by AETE. The TDE summary report is available at reference G. Only the Canada Unique design changes will be certified by DTAES. It is these design changes for which AETE testing is required to complete certification, i.e. High Frequency Selective Calling (HF SELCAL), Iridium Civil Satellite Communication (SATCOM) and the Single Switch Zeroize. The OT&E is focused on the entire RCAF CC130J Block 7.0 Upgrade, including both the Common Core and Canada Unique capabilities.

6. The ET&E and OT&E program for the CC130J Block 7.0 Upgrade will be conducted in phases. The phases will be managed by AETE/TOTEF. The phases are:

a. Phase 1 – Pre-Acceptance Activities:

- (1) LM will conduct Developmental Test and Evaluation (DT&E) on the Trial Kit Installation (TKI) aircraft as per the test plan at reference H. This DT&E will be completed under the authority of LM.
- (2) AETE will attend LM TKI test activities and gather data to support some of the ET&E objectives (as specified in Annex A):
 - (a) Electromagnetic Compatibility (EMC) Ground Testing, 12-15 May 15;
 - (b) Mission Computer Operational Flight Program (MC OFP) Flight Regression, 28 May 15;
 - (c) Test Readiness Review (TRR), 6 Jun 15;
 - (d) LM/Customer DT&E Lab Testing, 6-10 Jun 15; and
 - (e) LM/Customer DT&E On-Aircraft Ground Testing, commencing 13 Jun 15 (2 weeks).

b. Phase 2 – Production Acceptance T&E (PAT&E): PAT&E will be conducted by AETE at the LM facility in Marietta, GA following the modification of the TKI aircraft; subsequently, acceptance activities will be

at Cascade Aerospace in Abbotsford, BC for remaining aircraft. The TKI aircraft acceptance is contractually scheduled as listed in the “Constraints” section of this RFE.

- c. Phase 3 – RCAF Dedicated ET&E and OT&E: Expected execution to take place at 8 Wing Trenton following return to Canada of the TKI aircraft.
- a. Phase 4 – Aircrew Training Suite:
 - (1) Acceptance Testing.
 - (2) OT&E.
 - (3) Support to Certification.

7. This RFE covers requirements and objectives for Phases 1 thru 3. Requirements for testing the aircrew training suite, Phase 4, will be covered in a follow-on RFE.

AIM

8. The aim of this project is to support the issuance of a Technical Airworthiness Clearance (TAC) and Operational Airworthiness Clearance (OAC) for CC130J Block 7.0 upgrade aircraft.

IMPLEMENTATION

9. Objectives. The aim of this project will be met through the following objectives:

- a. The AETE objectives are provided in Annex A.
- b. The TOTEF objectives are provided in Annex B.

10. Scope. The following factors amplify the objectives and define the scope of this project.

- a. It is expected that the ET&E and OT&E will be closely coordinated by AETE and TOTEF to maximize efficiency.
- b. The scope is further defined in Annex A and B.

11. Constraints. The following constraints apply to this project:

- a. PMO ACP-T has contracted for LM to:
 - (1) Support ten (10) customer Qualification Test and Evaluation (QT&E) flights over a twenty-five (25) working day period.
 - (2) In addition, LM shall support customer on-aircraft ground testing during this period.

- (3) LM shall also support the customer if the use of the LM Electronic Simulator (E-Sim) or Avionics Hot Mock Up (AHMU) laboratory is required.
 - b. AETE objective 1 (detailed in Annex A) must be completed prior to aircraft acceptance.
 - c. The AETE test plan encompassing all testing to be conducted at LM must be submitted to LM for review a minimum of 2 months prior to the first flight.
 - d. TKI aircraft acceptance is contractually scheduled as follows:
 - (1) Customer Acceptance TRR, 28-29 Jul 15;
 - (2) Customer Acceptance Testing (Ground and Flight), 10 Flights (DND Test Crew Required), 4-21 Aug 15;
 - (3) TKI Aircraft Available for Return to Canada (DND Crew Required), 2 Oct 15;
 - e. The CC130J Block 7.0 upgraded aircrew training suite located at 8 Wing Trenton will not be available for aircrew conversion training prior to aircraft fleet embodiment.
 - f. PMO ACP-T close-out is December 2016.
- 12. Method. As proposed by CO AETE and FC TOTEF.
- 13. Deliverables. The following deliverables are required by the Sponsor:
 - a. AETE:
 - (1) A preliminary report of results via email upon completion of significant milestones (e.g. witnessing of LM TKI test activities, PAT&E, etc.).
 - (2) Applicable acceptance certificates in accordance with Part 3 of reference I.
 - (3) If required, a preliminary report of results supporting the issuance of a Specific Purpose Flight Permit (SPFP) for OT&E.
 - (4) A final report within 60 days following completion of ET&E that includes a Disposition of Recommendations Annex (DORA) IAW reference J.

- b. TOTEF:
 - (1) A final report within 60 days following completion of OT&E that includes a DORA IAW reference J. Report may include recommendations for follow-on OT&E for certain capabilities, e.g. Link 16.
 - (2) If required, a follow-on OT&E report for certain capabilities.

14. Special Instructions. The following apply to this project:

- a. The TKI aircraft will be made available to support pilot, loadmaster, and technician training at Marietta, GA.
- b. The first Block 7.0 upgrade aircraft completed by Cascade Aerospace (Proof Fitment) will also be made available to support training and T&E activities upon return to 8 Wing Trenton.
- c. Flight Permits:
 - (1) DTAES will issue an experimental flight permit (EFP) to LM for DT&E as per the test plan at reference H.
 - (2) DTAES will issue an EFP to AETE for all ET&E, including PAT&E and any OT&E flights, which may be conducted as an Integrated Test Team with TOTEF.
 - (3) PMO ACP-T will arrange for a SPFP for dedicated OT&E flights by TOTEF.

PROJECT SUPPORT

15. Any PMO ACP-T based funding in support of this project, including direct tasking support and any AETE or TOTEF temporary duty (TD) is subject to the approval of PMO ACP-T.

16. The Project Sponsors agree to complete the DORA(s) included with test report(s) and return the completed document to AFTEC within 30 days of receipt to facilitate the project closure process.

COORDINATION

17. The points of contact for this project are:
- a. Technical Sponsor: Maj B. Cormier, PMO ACP-T SEM 3-3;
 - b. Operational Sponsor: LCol K. Kozak, SSO Tpt;
 - c. DTAES: Maj F. Allaire, DTAES 3-4;

- d. AFTEC: Maj N. Armstrong, DTAES 6-2;
- e. AETE:
 - (1) Maj J. Furlong, PCO;
 - (2) Maj S. Ilijanic, OIC AETE Det Trenton;
 - (3) Capt D. Vogelsang, AETE Project Officer;
 - (4) Capt D. Leblanc, AETE Project Pilot;
- f. TOTEF:
 - (1) Maj N. Pettitt, FC TOTEF;
 - (2) Capt P. Couillard, TOTEF PO;
 - (3) Capt M. Dawe, TOTEF PO;
- g. 436 (T) Sqn: Maj P. Anderson, Pilot; and
- h. TRSET: Maj S. Loder, SE 5.

Annexes:

Annex A: AETE Objectives
Annex B: TOTEF Objectives

Annex A
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Annex A: AETE Objectives

Note: The types of flight test are defined in reference I. The underlined action-words used to define the objectives of this project were determined IAW reference J. The Certification Plan is at reference K.

	Objective	Type of T&E			
		Certification T&E	Qualification T&E	PAT&E	Technical T&E
1	<u>Confirm</u> that the CC130J Block 7.0 Upgrade aircraft complies with all Canada Unique requirements in the "Verification Cross Reference Matrix" in Table 4.1 of reference C that require a verification method of "Demonstration" or "Test".	No	Yes This objective will be completed by reviewing the LM DT&E results and witnessing the LM TKI test activities. AETE is only required to report on deltas or areas of concern. This objective must be completed prior to aircraft acceptance.	No	No
2	<u>Validate</u> the Check Flight Procedures at reference L (or as updated and promulgated by LM) for PAT&E activities on each Block 7.0 Upgrade aircraft and propose amendments needed to satisfy the requirements of the Flight Test Orders for the Canada Forces (reference H).	No	No	Yes	No
3	Conduct the PAT&E IAW the validated Check Flight Procedures and the Flight Test Orders for the Canadian Forces (reference I).	No	No	Yes	No

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	Objective	Type of T&E			
		Certification T&E	Qualification T&E	PAT&E	Technical T&E
4	<u>Confirm</u> operation of the HF SELCAL and Iridium Civil SATCOM in both the Southern (SDA) and Northern Domestic Airspace (NDA).	Yes Certification requirement: MIL-HDBK-516B Section 11.1.1.4 AETE to confirm continuity of service throughout intended missions. HF SELCAL requires flight test and Iridium Civil SATCOM requires ground and flight test.	No	No	No
5	<u>Verify</u> that HF SELCAL and Iridium Civil SATCOM audio communication systems have tone/speech intelligibility of sufficient quality to ensure safe and effective operation.	Yes Certification requirement: MIL-HDBK-516B Section 9.2.8 – ground or flight test	No	No	No

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	Objective	Certification T&E	Type of T&E		
			Qualification T&E	PAT&E	Technical T&E
6	<u>Confirm</u> aircrew workload related to HF SELCAL, Iridium Civil SATCOM and Single Switch Zeroize is acceptable.	Yes Certification requirements: MIL-HDBK-516B Sections: 6.1.5.12 – flight test 9.2.1.1 – ground or flight test in night and day conditions with representative anthropometric range and ALSE 9.2.2 – flight test with representative anthropometric range and ALSE 9.4.1 – flight test 9.4.4 – ground or flight test 11.2.1.3 – ground or flight test This objective will be completed by reviewing the LM DT&E results and witnessing the LM TKI test activities. AETE is only required to report on deltas or areas of concern.	No	No	No
7	<u>Confirm</u> HF SELCAL, Iridium Civil SATCOM and Single Switch Zeroize lighting for day and night unaided conditions.	Yes Certification requirements: MIL-HDBK-516B Sections: 9.3.1 – ground or flight test 9.3.2 – ground or flight test This objective will be completed by reviewing the LM DT&E results and witnessing the LM TKI test activities. AETE is only required to report on deltas or areas of concern.	No	No	No

Annex A
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		Type of T&E			
	Objective	Certification T&E	Qualification T&E	PAT&E	Technical T&E
8	<u>Confirm</u> HF SELCAL, Iridium Civil SATCOM and Single Switch Zeroize lighting for NVG compatibility.	Yes Certification requirements: MIL-HDBK-516B Section 9.3.4 – ground or flight test This objective will be completed by reviewing the LM DT&E results and witnessing the LM TKI test activities. AETE is only required to report on deltas or areas of concern.	No	No	No
9	<u>Demonstrate</u> navigation capability while: a. operating in high latitude / northern polar regions; and b. conducting polar, equatorial and antemeridian / dateline crossings.	No	No	No	Yes

Annex B
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Annex B: TOTEF Objectives

Note: The types of flight test are defined in reference I. The underlined action-words used to define the objectives of this project were determined IAW reference N.

	Objective	OT&E
1	<u>Assess</u> the operational effectiveness and suitability of the CC130J Block 7.0 Upgrade capabilities during normal and cold weather operations.	OT&E considers: <ul style="list-style-type: none"> a. CC130J Block 7.0 Common Core and Canada Unique capabilities. b. Review of references M and N. c. Review of the scope of the RAF OT&E outlined in reference O is required to identify areas where the RCAF can leverage the opportunity to participate in or obtain test data from this test program to minimize the scope of the RCAF dedicated OT&E program. d. No flight test will be conducted on the HARAD. e. Objective 3 requires participation in an exercise employing the Link 16 TDL (e.g. Maple Flag in 2016). Results from testing at the exercise may be reported in a follow-on OT&E report.
2	<u>Assess</u> crew workload during representative mission scenarios.	
3	<u>Assess</u> the operational suitability of the Link 16 TDL.	
4	<u>Assess</u> the operational suitability of the Portable Flight Planning System (PFPS) mission planning software and associated data transfer system developed for the Block 7.0 aircraft.	
5	<u>Identify</u> and/or <u>assess</u> procedures for the operational use of CC130J Block 7.0 capabilities.	
6	<u>Assess</u> associated CC130J Block 7.0 publications.	