สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

GUIDANCE MATERIAL FOR AIRCRAFT MAINTENANCE

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Approved By

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Director General
The Civil Aviation Authority of Thailand

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ABBREVIATIONS

AD	Airworthiness Directive
AMC	Acceptable Means of Compliance
AMM	Aircraft Maintenance Manual
AMP	Aircraft Maintenance Plan
AOA	Angle of Attack
AOC	Air Operator Certificate
AOG	Aircraft On Ground
ATL	Aircraft Technical Log
CAAT	The Civil Aviation Authority of Thailand
CMM	Component Maintenance Manual
CRS	Certificate of Release to Service
C/S	Certifying Staff
EMM	Engine Maintenance Manual
ESD	Electrostatic Discharge
EWIS	Electrical Wiring Interconnection Systems
FC	Flight Cycles
FH	Flight Hours
FTS	Fuel Tank Safety
IDG	Integrated Drive Generator
LDG	Landing Gear
MCC	Maintenance Control Center
MEL	Minimum Equipment List
MOE	Maintenance Organisation Exposition
MPD	Maintenance Planning Document
SB	Service Bulletin
S/S	Support Staff
TAT	Total Air Temperature
TCAR	Thailand Civil Aviation Regulation
TCH	Type Certificate Holder

0. INTRODUCTION

0.1 Scope and Applicability

The Civil Aviation Authority of Thailand (CAAT) is the Competent Authority for maintenance organisations[1] that are involved in the maintenance of Thai registered aircraft and components intended for fitment thereto as established by TCAR Part 145.A.1 General. CAAT is therefore responsible for the final approval of these maintenance organisations and for establishing procedures detailing how TCAR Part 145 applications and approvals are managed.

This Guidance Material (GM) is applicable to TCAR Part 145 applicants and TCAR Part 145 maintenance organisations regardless of whether their principal place of business is located within Thailand or internationally. The provisions of this GM support the maintenance organisation certification requirements detailed in TCAR Part 145 and do not supersede or replace any associated regulatory requirements.

0.2 Purpose

The purpose of the GM is to provide guidance regarding:

- the privileges and limitations associated with a scope of approval for line maintenance
- the complexity and level of aircraft maintenance that can be performed under a line maintenance scope of approval
- maintenance away from approved locations as per TCAR Part 145, 145.A.75(c)
- availability of Certifying Staff (C/S)
- policy on certificate of release to service for aircraft maintenance

0.3 Associated Instructions

CAAT has developed associated provisions (guidance, forms, and templates) that detail specific matters, which need to be considered as an integral part of this GM. This information is available on the CAAT website (www.caat.or.th)

0.4 Communication

All documents and correspondence between the maintenance organisation and CAAT should be in English. The official e-mail is air-amo@caat.or.th.

0.5 Management of Approvals by CAAT

Maintenance Organisation's scope of approval must be approved by CAAT. This is done as part of the MOE approval or CAAT MOE supplement acceptance process.

[1]The terms "Maintenance Organisations" and "Repair Stations" should be read interchangeably in this Guidance Material.

0.6 References

- Air Navigation Act B.E. 2497
- Regulation of Civil Aviation Board (RCAB) No. 77 Qualification and Privileges of Applicants for Aircraft Maintenance Engineers
- Requirements of the Civil Aviation Authority of Thailand Issue 2 on Repair Station Certificate
- Requirements of the Civil Aviation Authority of Thailand Issue 5 on Foreign Repair Station Certificate
- Requirements of the Civil Aviation Authority of Thailand Issue 22 on Reporting of Civil Aviation Occurrences
- Thailand Civil Aviation Regulation on Repair Station Certificate Requirements (TCAR Part 145)
- Acceptable Means of Compliance to Thailand Civil Aviation Regulation on Repair Station Certificate Requirements (AMC to TCAR Part 145)
- Announcement of CAAT on Air Operator Certification Requirements B.E. 2564 (AOCR)

1. PRIVILEGES AND LIMITATIONS OF LINE MAINTENANCE

1.1 Definition of Aircraft Line Maintenance Scope of Work

Line maintenance should be understood to be any maintenance that is carried out before flight to ensure that the aircraft is fit for the intended flight.

The definition of aircraft line maintenance is provided in AMC1 145.A.10, together with a list of activities that may be considered as line maintenance.

It is not possible to provide a demarcation between line and base maintenance that has general applicability in all cases. For this reason, a maintenance organisation must establish in MOE chapter 1.9, a clear definition of line maintenance capability, taking into account the guidance provided below in 1.5 Examples of Maintenance Activity Considered to be Base Maintenance.

1.2 Organisation Responsibilities

A maintenance organisation must assess and ensure, prior to any intended maintenance event, that the activity can be carried out under its line maintenance scope of approval (AMC1 145.A.10) and does not fall under 1.5 of this GM.

Note: A maintenance event is intended to be the condition or period when an aircraft is under the responsibility of a maintenance organisation for the purpose of undergoing one or a series of maintenance tasks which are identified in a work order formally issued by the operator.

This assessment may not need to take place each time, and can be based on already established MOE procedures (e.g. the fact that a daily check is a line maintenance task is obvious and does not need to be assessed each time).

Even if the assessment confirms that the activity is line maintenance, a maintenance organisation must also verify if this activity requires means other than the ones already in use at a line station (use of a hangar, platforms, stands, etc.).

1.3 When to Assess the Maintenance Activity

A maintenance organisation's assessment to decide if any maintenance event falls within the definition of line or base maintenance, may be needed in two different scenarios:

- an initial or change of approval, when evaluating the scope of work the maintenance organisation is applying for
- an already approved maintenance organisation, when evaluating if maintenance requested by the customer (new SB, defect rectification, work package, etc.) falls within the approved line maintenance scope of work

1.4 Assessment of the Intended Scope of Work (Initial or Change of Approval)

It is the responsibility of a maintenance organisation to demonstrate to CAAT that the intended scope of work may be carried out in a line maintenance environment, under its line maintenance scope of approval.

Note: Similar considerations may apply for a base maintenance scope of approval as mentioned in 1.5.

Generally, line maintenance is limited to:

- trouble shooting and defect rectification not requiring special ground support usually relevant to base maintenance (e.g. special equipment, structured production planning, complex and lengthy maintenance)
- component replacement including:
  - scheduled component replacements included in the scheduled maintenance activity identified in MOE chapter 1.9 (as part of minor scheduled line maintenance or scheduled checks identified below)
  - unscheduled component replacement in relation to a defect rectification (AOG, MEL closure, etc.)
- minor repairs and modifications that do not require extensive disassembly and can be accomplished by simple means
- minor scheduled line maintenance (those scheduled tasks not exceeding the weekly check as specified in the aircraft maintenance program)
- scheduled checks (those scheduled tasks which exceed the weekly check, or equivalent as determined by CAAT). As each operator customises the aircraft maintenance program and groups maintenance intervals as necessary, a maintenance organisation must review the intended maintenance from the operator and identify in the TCH data (e.g. MPD) the maintenance level that allows it to carry out that intended maintenance. The outcome of this exercise is to identify the intended limitation of the line maintenance scope of approval, in terms of scheduled maintenance checks.

  Note: A maintenance organisation approved with such limitation, may receive a stand-alone request to perform a particular task, the interval of which does not fall in the typical interval framework (typically referred as an “out-of-phase” task) and exceeds this limitation.

  For example, an organisation is approved with a limitation of 3000 FH on a certain aircraft type, and the customer is requesting a single out-of-phase task at a 3500 FH interval, which exceeds the maintenance level check identified in the scope of approval. This task may be carried out provided it complies with the decision making process. This means that the task is verified to be within the capability of the organisation in terms of maintenance data, tools, materials, personnel competence, etc. and the level of complexity remains within the limit of line maintenance (in case the activity is done under a line maintenance scope of approval).

  In particular, the following is expected:
  - Depending upon the manufacturer’s policy for the development of scheduled maintenance requirements, a clear limitation to the maintenance scope of work would normally be expressed in one of the following ways:
    - “up to and excluding X check” (X=2A, 3A, etc.) for an MPD, where maintenance check packages and letter checks are used
    - “up to and excluding “X FH / Y FC / Z calendar time” for an MPD, where task intervals are given in the appropriate usage parameters (e.g. flight hours, flight cycles, calendar time, APU hours). An example would be “up to and excluding 3000 FH, 750 FC, 12 months”.

- the identified limit, to be indicated in MOE chapter 1.9, must be such that all the related routine or scheduled tasks exclude any of the tasks listed in 1.5
- a decision making process needs to be established in the MOE (normally chapter 2.28: Production Planning Procedure) in order to assess:
  - the need to access a hangar (even if the activity is permitted under a line maintenance scope of approval), considering the type of aircraft, the maintenance event type and complexity, as well as the environmental and weather conditions
  - any work order or work package received from the operator to ensure it may be fully performed under a line maintenance scope of approval, taking into account additional work to the original work package that may be added, leading outside of the line maintenance scope of work, such as:
    - the addition of previously deferred maintenance tasks
    - defects arising from routine tasks (these defects are not known in advance, but the related risk in terms of number and level of defects needs to be taken into account and estimated in advance)

Note: As an example of a decision making process, a 2A maintenance check on a B737 classic aircraft type is normally considered line maintenance when the routine tasks are assessed as per the manufacturer MPD or operator AMP. Therefore, a maintenance organisation may be approved to perform this check under a line maintenance scope of work.

However, a work order to perform the 2A check, where the operator requests the performance of work in addition to the 2A routine tasks, such as the addition of ADs, SBs or deferred tasks, would need to be carefully assessed by the maintenance organisation with the use of the decision making process. This type of maintenance check may easily fall within the examples given in 1.5, and therefore be considered as base maintenance and fall outside the maintenance organisation scope of work.

In such a case, the outcome of the decision making process could be:

- the impossibility to accept such a work order from the operator, being outside the scope of work of the maintenance organisation, or
- to agree with the operator on a revised work order, to remove the works which have been identified as base maintenance tasks (removal of an SB that would require extensive disassembly and modification of flight controls, etc.)

1.5 Examples of Maintenance Activity Considered to be Base Maintenance

When any of the following tasks have to be carried out (regardless if they are contained in a scheduled maintenance check or arising from a defect rectification or AOG situation), a base maintenance scope of approval is needed:

- a number of different types of tasks need to be carried out, even if taken singularly those tasks may still fall under the definition of line maintenance (a combination of routine task cards, non-routine task cards issued following defects discovered during the check, out-of-phase tasks, deferred items from previous maintenance, minor repairs, minor modifications, component replacement, etc.). Such cases require base maintenance production planning support or a base maintenance release to service process (category RCAB 77 Article 8.A.1 C/S supported by category RCAB 77 Article 8.A.1 S/S) in order to ensure that all the maintenance ordered has been carried out before issuing the CRS

- maintenance tasks or replacement of any major component, either scheduled or unscheduled, where the related maintenance procedures clearly address the need for a hangar environment requiring special ground support equipment or structured production planning and complex and lengthy maintenance, such as a full landing gear replacement, etc.
- any scheduled maintenance task (e.g. routine task from the MP) which requires extensive disassembly of the aircraft or extensive in-depth inspection
- major repairs and major modifications
- trouble shooting and defect rectification requiring special ground support usually relevant to base maintenance (e.g. special equipment, structured production planning, complex and lengthy maintenance)
- a scheduled maintenance event, which in the planning phase has already been identified as significant in terms of duration or man-hours (e.g. an aircraft down time above 72 hours or four shifts whichever is less)
- a work package requiring a complex team composition in terms of high numbers and categories (avionics, structures, cabins, NDT qualifications and skills, etc.) of staff involved per shift
- the management of the event by aircraft license category RCAB 77 Article 8.A.1 C/S

Note: The maintenance organisation remains responsible for ensuring that even if each individual work order falls under the line maintenance activity, a maintenance event that combines several of these work orders remains within the line maintenance scope of activity

1.6 Assessment of Maintenance Tasks by an Approved Maintenance Organisation

An approved maintenance organisation remains responsible for assessing if any maintenance requested by the customer falls within the approved line maintenance scope of work.

This assessment is expected to be performed based on the decision making process described in the 1.4.

2. MAINTENANCE AWAY FROM THE APPROVED LOCATIONS

2.1 Definition and Applicability

TCAR Part 145, 145.A.75(c) permits a maintenance organisation to "*maintain any aircraft or any component for which it is approved at any location subject to the need for such maintenance arising either from the un-serviceability of the aircraft or from the necessity of supporting occasional line maintenance, subject to the conditions specified in the exposition*"

Activity outside the approved locations can be carried out under two cases, as described in the following paragraphs 2.2 and 2.3

2.2 Maintenance Away from the Approved Location under Approved Privileges as per 145.A.75(c)

The procedures related to granting this privilege are approved by CAAT based upon the ability of the maintenance organisation quality system to deal adequately with the Part 145 requirements. Normally, this ability cannot be demonstrated at the time of the initial approval and therefore this procedure cannot be included in the MOE or approved by CAAT before the first renewal cycle has been completed. Exceptions may be granted on a case-by-case basis for maintenance organisations that have a justified need to work outside the approved locations immediately after initial approval.

Where the maintenance organisation intends to propose an MOE procedure that deviates from any applicable condition detailed in this GM, CAAT will make a case-by-case assessment before approving the procedure. In such cases, the request originated by the maintenance organisation must:

- clearly identify which condition of this GM is not met
- detail the justification for requesting the deviation
- describe how the proposed procedure ensures an equivalent level of safety and compliance with applicable regulations

As a matter of principle, whenever this privilege is used, the maintenance organisation must evaluate the risk associated with the task to be performed and implement mitigating measures.

Note: the fact that a maintenance organisation has been granted these privileges must not be taken as an approval for any maintenance task to be performed at any location, or that such locations become approved locations

2.2.1 Possible Scenarios

The following scenarios may be considered under approved privileges, meaning that the related maintenance activity outside the approved locations can be carried out based on a control procedure in the MOE.

<u>Scenario 1 – occasional aircraft line maintenance:</u>

- this applies only to an Ax rated maintenance organisation when there is a need to support an aircraft operation in a non-approved location for line maintenance (one-time flight, short term or seasonal contract, flight schedule change, etc.). The use of this privilege is specifically limited to those cases where the maintenance organisation has a maintenance

contract with the operator requesting such maintenance outside the approved location and is subject to an MOE control procedure that meets the minimum requirements specified in 2.2.2.1.

Scenario 2 – Ax rated maintenance organisation supporting an unserviceable aircraft due to an unscheduled event (AOG):

- this applies to the need for aircraft maintenance in the case of an unscheduled or unexpected event, such as an AOG, requiring defect rectification, and is subject to:
  - an MOE control procedure which meets the minimum requirements specified in 2.2.2.2
  - the privilege being limited to the Ax rated maintenance organisation having received a work order or having a maintenance contract with the operator requesting such maintenance outside the approved location

Note: in the case of base maintenance activity, prior notification has to be sent to CAAT before starting the activity, to allow evaluation of the risk and the need for an on-site audit

Scenario 3 – Bx/Cx rated maintenance organisation to support on-wing maintenance:

- this applies only to activities carried out on-wing following a maintenance work order received from the operator (either scheduled or unscheduled maintenance) and is subject to:
  - an MOE control procedure which meets the minimum requirements specified in 2.2.2.2
  - the activity being performed on-wing without removal of the component. Nevertheless, the Bx/Cx maintenance organisation may temporarily remove a component for maintenance, in order to improve access to that component, except when such removal generates the need for additional maintenance

    Note: temporarily implies that the component removed is re-fitted on the same aircraft during the same maintenance event before final aircraft CRS

  - The MOE of the Bx/Cx maintenance organisation:
    - including procedures for the necessary coordination between the Bx, Cx (as applicable) and the Ax rated maintenance organisation responsible for issuing the aircraft CRS
    - clearly indicating that the maintenance organisation is allowed to perform maintenance, as applicable, on an installed component, engine or APU (i.e. on-wing), including any associated conditions
    - specifying under which condition such maintenance organisation may be allowed to use aircraft maintenance data

      Note: EMM or CMM tasks are more detailed and with higher restrictions than any equivalent or similar AMM task supposed to be performed only during aircraft operations. Therefore, in the cases where the Bx/Cx rated maintenance organisation is intending to use the AMM instead of the relevant EMM or CMM data, the maintenance organisation must liaise with the operator to have a clear indication in the work order to use the AMM. Such a decision cannot be that of the B/C rated maintenance organisation, which must respectively use EMM or CMM data unless otherwise specified in the work order.

      Where the maintenance task to be performed is only included in the engine or component maintenance data (e.g. it is only in the EMM or CMM) confirmation from

the TCH is needed that the task can be carried out outside the workshop environment

- In cases of scheduled maintenance, the repetitive use of the privilege at the same location or for the same operator at different locations is not permitted
- With regards to a Cx rating, this privilege is intended for those components that are not readily transportable (thrust reverser, radome, LDG strut, etc.)

Scenario 4 – NDT activities under D1 rating:

- this applies only to a D1 rated maintenance organisation. This class rating is only necessary for a maintenance organisation that carries out NDT as a particular task for another maintenance organisation and, by definition, this activity may need to be carried out at the customer's facility where the particular aircraft, engine or component is located, and is subject to:
  - an MOE control procedure which meets the minimum requirements specified in 2.2.2.2
  - the inclusion in the MOE of procedures for the necessary coordination between the D1 rated maintenance organisation and, as applicable, the Ax, Bx, Cx rated maintenance organisation responsible for issuing the final CRS of the aircraft, engine, or component on which the NDT activity is carried out

  Note: CAAT does not normally issue TCAR Part 145 approvals to D1 maintenance organisations only performing activities outside the approved locations without a permanent facility at the approved address where all applicable TCAR Part 145 organisational requirements are met, with particular reference to having facilities, personnel, maintenance data, tools and equipment to perform the intended and approved scope of work.

The following table summarises the acceptable cases of working outside the approved locations under an indirect approval privilege:

Indirect Approval	Ax		Bx	Cx	D1	MOE Control Procedure
	Line	Base				
Scenario 1 – Occasional aircraft line maintenance	X					2.2.2.1
Scenario 2 – A rated maintenance organisation to support an unserviceable aircraft due to an unscheduled event (AOG)	X	X				2.2.2.2
Scenario 3 – B/C rated maintenance organisation to support on-wing maintenance			X	X		2.2.2.2
Scenario 4 – NDT activities under D1 rating					X	2.2.2.2

2.2.2 Conditions to be Specified in the MOE

When a maintenance organisation wishes to use the privileges described in the previous paragraph, MOE chapter 1.9: Scope of Work must make reference to the fact that the maintenance organisation may perform works away from the approved locations, subject to the conditions specified in MOE chapter 2.24: Specific Maintenance Procedures.

The MOE chapter 2.24 procedures must be developed based on the following paragraphs as applicable to the intended scenario and are intended to specify:

- which maintenance tasks are going to be performed under such privileges

- how the maintenance organisation is going to ensure that the TCAR Part 145 requirements are met in each case (in particular with regards to adequate facilities, sufficient staff, appropriate C/S, availability of tooling and equipment, availability of current maintenance data, adequate planning, release to service procedures, etc.)
- how the maintenance organisation's management system is going to monitor compliance with the above requirements

2.2.2.1 Occasional Aircraft Line Maintenance (Scenario 1)

The procedure must be based on the following criteria:

a) Scope of work must be limited to:
   - aircraft type listed in MOE chapter 1.9: Scope of Work
   - routine tasks up to and including weekly check (or MOE chapter 1.9 maintenance level whichever is less)
   - trouble shooting and defect rectification
   - any other specific limitation relevant to the maintenance organisation class rating, as indicated in 2.2.1 under scenario 1

b) A process must be in place, under the responsibility of the Compliance Monitoring Manage, to show:
   - how the Maintenance Manager ensures that the necessary facilities, C/S, tools, equipment, materials, maintenance data will be made available as necessary and how the maintenance records will be managed
   - the involvement of the Management System and its approval for the occasional line maintenance, based on the following criteria:

Use of the non-approved location (consecutive calendar days)	Approval
Equal to, or less than, 10	Issued by the Compliance Monitoring Manager based on an on-site audit or a desktop review
Between 10 and 40	Issued by the Compliance Monitoring Manager based on an on- site audit
Note: When the duration expected for the maintenance is more than 40 days, approval for a new line station must be requested from CAAT to be listed in MOE chapter 5.3 (list of line maintenance locations as per TCAR Part 145, 145.A.75 (d))	

   - that, when the privilege is used for more than 10 days (second case in the Table above), CAAT is notified of such approval within 7 days from the date of the beginning of the operation. In addition, that a list of all the CRS issued under this procedure must be made available to CAAT upon request

c) The notification must be formalised by advising CAAT the following minimum information:
   - operator requesting the maintenance activity
   - aircraft type(s)
   - scope of the requested maintenance activity
   - location
   - number and category of C/S assigned to support this activity
   - Compliance Monitoring Manager signature

d) In the case of scheduled maintenance, the repetitive use of the privilege at the same

location or for the same operator at different locations is not permitted

2.2.2.2 Maintenance Outside the Approved Locations other than "Occasional Line Maintenance" (Scenario 2, 3 and 4)

The procedure, must be based on the following criteria:

a) The scope of work must be limited to:
   - aircraft type, components, engines or NDT methods and associated maintenance levels as listed in MOE chapter 1.9: Scope of Work
   - any other specific limitation relevant to the maintenance organisation class rating, as indicated in 2.2.1 under scenarios 2, 3 and 4, as applicable

b) A process must be in place, under the responsibility of the Compliance Monitoring Manager, describing:
   - how the Maintenance Manager ensures that the necessary facilities, C/S, tools, equipment, materials, maintenance data will be made available as necessary and how the maintenance records will be managed
   - the involvement of the Management System and its approval for any work away from the approved location, based on a desktop review
   - the availability of a list of all the CRS issued under this procedure which must be made available to CAAT upon request
   - where scenario 2 is used to perform aircraft base maintenance activities, a notification must be sent to CAAT before starting the activity (the minimum information listed in paragraph 2.2.2.1 c) is expected with the notification)

2.3 Direct Approval of Other Maintenance Outside the Approved Locations

CAAT may consider additional scenarios for maintenance outside the approved locations in cases not already covered by the previous paragraph 2.2, to be approved on a case-by-case basis, therefore subject to a direct approval.

The prerequisite for considering any additional scenario is a demonstration of need (warranty claims, support of Thai operator, etc.). The related assessment by CAAT will be made by a risk based approach and level of confidence with the maintenance organisation.

The following are non-exhaustive examples of additional scenarios subject to direct approval:

- one time or temporary need of an Ax maintenance organisation to perform scheduled aircraft base maintenance
- temporary need of a Bx/Cx maintenance organisation to perform several scheduled on-wing activities on different aircraft (e.g. implementation of modification campaign following SBs, ADs)
- need of a Bx/Cx maintenance organisation to perform maintenance outside the approved locations at another Bx/Cx workshop (workshop off-wing maintenance)

Such cases can be evaluated by CAAT subject to a concession request as per MOE chapter 3.15 procedure, specifying as a minimum:

a) the proposed scenario, including locations and demonstration of need
b) statement from the Management System that the conditions in which the intended maintenance will be carried out have been verified to be in compliance with applicable

TCAR Part 145 requirements. Prior agreement with CAAT is necessary to decide if this statement needs to be based on a desktop or on-site audit by the Management System. This agreement will depend on the level of confidence in the maintenance organisation's management system regarding the maintenance task.

c) confirmation that any maintenance according to the proposed scenario will be only started after approval by CAAT

CAAT will review the application and evaluate, depending upon the level of confidence in the maintenance organisation's management system, if it must be finalised with a desktop or on-site audit. CAAT must be consulted for a final decision on this matter and the approval will be finalised by CAAT.

In the case of scheduled aircraft base maintenance, the CAAT oversight plan will include a sampling of the documentation associated with the activity performed outside the approved location (e.g. review of maintenance records), and when practicable will also include an on-site audit during the on-going maintenance.

3. LINE STATION WITHOUT PERMANENT RCAB 77 ARTICLE 8.A.1 STAFF

TCAR Part 145, 145.A.30(g) requires that any maintenance organisation maintaining aircraft have, in the case of aircraft line maintenance, appropriate license holders as described in RCAB 77 Article 7 and for each category in RCAB 77 Article 8 A.1, A.2 and A.3. The only category allowed to release an aircraft is category RCAB 77 Article 8 A.1. Other categories are authorised to sign a maintenance release on the systems corresponding to their specialty.

As a consequence, maintenance organisations must demonstrate, in accordance with RCAB 77 Article 8 A.1, A.2 and A.3., that category A.1 C/S are available in the maintenance organisation for each aircraft type intended to be included in the approved scope of work.

However, when a maintenance organisation is operating at various line stations, it is not necessary for category A.1 staff to be permanently available at each line station provided that at line stations where a category A.1 C/S is not available, one of the following conditions can be met:

Option a) The line maintenance contracts in place (e.g. IATA SGHA (standard ground handling agreement)), clearly specify that the contracts are limited to defect rectification.

In this case the maintenance organisation does not need to provide any evidence that C/S are permanently available at the line station for such a contract.

Option b) The line maintenance contracts in place do not have limitations.

In this case, the situation needs to be evaluated depending on the volume of work performed at the line station (number and type of contracts in place, flight schedules, on-call maintenance, etc.), taking into account the probability of having a defect which can be only solved exercising the privileges of category A.1 C/S. As a general criteria, it may be considered acceptable not to have a category A.1 C/S permanently on site provided that one can be made available within a reasonable timeframe to support the operation (maximum travel time 2 hours).

Such category A.1 C/S can be either one of the maintenance organisation's category A.1 C/S or a contracted "on call" category A.1 C/S from another maintenance organisation. This category A.1 C/S could be sufficient to support more than one line station within the limits of AMC1 145.A.30(d)1 since the category A.1 C/S will sign on behalf of the contracting maintenance organisation, they must be appropriately trained, assessed and authorised (issued with a Certifying Staff authorisation). This is not necessary if the defect is rectified and released by the contracted maintenance organisation under its own privileges.

Where the maintenance organisation is operating at line stations where category A.1 C/S are not permanently available, MOE chapter L2.3: Line Maintenance Control of Defects and Repetitive Defects, must include a procedure on how to deal with defects requiring category A.1 C/S.

4. POLICY ON CERTIFICATES OF RELEASE TO SERVICE FOR AIRCRAFT MAINTENANCE AND ASSOCIATED RESPONSIBILITIES OF MAINTENANCE ORGANISATIONS AND AOC HOLDERS

The following guidance specifically addresses the maintenance of aircraft operated by Air Operator Certificate Holders.

4.1 Continuing Airworthiness Responsibilities, Including Maintenance

Continuing airworthiness responsibilities are described in detail in the Announcement of CAAT on Air Operator Certification Requirements B.E. 2564 (AOCR). Different provisions are in place depending upon the aircraft category and type of operations. However, all these provisions have two aspects in common:

- the operator is responsible for all activities aimed to determine the airworthiness status of the aircraft and to appropriately plan and coordinate maintenance
- the contracted maintenance organisation or, where permitted by TCAR Part 145, the independent C/S, is responsible for adequately performing and certifying the maintenance ordered by the operator

An AOC Holder is responsible for the continuing airworthiness of its aircraft. These responsibilities include, among other aspects, ensuring that all maintenance requirements (ADs, maintenance program requirements, defect rectifications, etc.) are complied with and released by approved TCAR Part 145 maintenance organisations. This means that the operator is responsible for planning and ordering all required maintenance and for verifying that all the ordered maintenance has been released to service by the approved TCAR Part 145 maintenance organisation.

However, the operator is not responsible for the actual performance of maintenance, which is the responsibility of the TCAR Part 145 maintenance organisation issuing the CRS. Important aspects to be considered are the following:

- the CRS must be issued by C/S of the TCAR Part 145 maintenance organisation
- when maintenance is performed and released by the TCAR Part 145 maintenance organisation, the operator must have procedures to verify that all the maintenance ordered from that organisation has been released to service by that organisation
- since the CRS only certifies that the maintenance ordered by the operator has been performed and released in accordance with TCAR Part 145, it does not guarantee that all the continuing airworthiness requirements have been met, for example there may be some missing maintenance that has not been ordered by the operator. This is the responsibility of the operator
- consequently, the operator must have procedures to ensure that a flight does not take place unless all the continuing airworthiness requirements are met. This could be met, for example, by a procedure where the operator receives a communication from the maintenance organisation and the operator notifies the commander that there is no other maintenance due. However, other procedures are possible, for example, delegating to the TCAR Part 145 maintenance organisation the notification to the commander
- the CRS issued by the TCAR Part 145 maintenance organisation must be held onboard the aircraft as part of the technical log system, together with all the information related to rectification of defects, deferral of maintenance actions, etc. This information must be

available to the commander, who has the ultimate responsibility for accepting the aircraft before a flight takes place
- the technical log system must also contain a maintenance statement issued by the operator providing the status of what scheduled, and out-of-phase maintenance is next due. However, this maintenance statement does not need to be onboard if the operator has alternate procedures to control the next maintenance due and these are acceptable to CAAT
- the maintenance statement, if placed onboard the aircraft, does not supersede the obligation to also have the TCAR Part 145 CRS onboard and available to the commander

4.2 Certification of Maintenance

A CRS must be issued by an appropriately authorised C/S on behalf of the maintenance organisation:

- after it has been verified that all maintenance ordered has been properly carried out by the maintenance organisation
- in accordance with the procedures specified in TCAR Part 145, 145.A.70
- taking into account the availability and use of the maintenance data specified in TCAR Part 145, 145.A.45
- ensuring that there are no non-compliances which are known to endanger flight safety
- before flight at the completion of any maintenance

4.3 How many CRS can or should be Issued

TCAR Part 145 requires a CRS to be issued before flight at the completion of any maintenance. The words “any maintenance” can be interpreted in different ways, such as:

- any maintenance task
- any combination of maintenance tasks
- any maintenance event

As a result, TCAR Part 145 allows different systems of release to service, such as:

- several CRS are issued, each one of them covering a single maintenance task
- several CRS are issued, each one of them covering a certain group of tasks
- a single CRS is issued covering all the maintenance included in a maintenance event
  Note: refer to Part 5 of this GM for further details

Regardless of which release system is used, the release to service procedure implemented by the maintenance organisation must be adequate for the type of organisation, complexity, scope of work, etc., and must ensure compliance with release to service requirements. This means, among other aspects, that:

- a CRS must clearly identify the work performed and, if applicable, any incomplete work and the corresponding limitations
- a CRS can only be issued by C/S holding certification privileges for all the maintenance tasks covered by the release statement
- in the case of base maintenance, the CRS must be issued by RCAB 77 Article 8.A.1 category C/S

- the release to service procedures must ensure that all the maintenance actions have been properly coordinated, and the release to service is issued within a reasonable timeframe after the actual performance of the tasks

In addition, it is important to stress that a release to service, whether it is single or multiple, does not necessarily mean that the aircraft is airworthy and ready for flight. A release to service is just a release after the performance of maintenance and its issuance is the responsibility of the maintenance organisation. However, the responsibility for defining the airworthiness status of the aircraft is the responsibility of the operator.

4.4 What Does This Mean: "There are no Non-Compliances which are known to Endanger Flight Safety"?

The intent of this requirement is to cover those cases where the maintenance organisation, during the performance of the maintenance ordered by the operator, discovers a non-compliance that endangers flight safety. However, it is not the intent to require the maintenance organisation to find or become responsible for hidden non-compliances, which are not expected to be discovered during the ordered maintenance.

Questions have been raised as to whether this also includes those situations where, after performing the maintenance ordered by the operator, the aircraft is left in a non-airworthy configuration. This could be the case, for example, where the maintenance organisation removes an engine for preservation without installing a new one, or performs an NDT inspection and finds a crack outside limits. In these cases, can a CRS be issued for the maintenance performed?

All the cases mentioned above, including those of non-compliances affecting flight safety discovered during maintenance, can be properly addressed by using the provisions contained in TCAR Part 145, 145.A.50(c) and (e). Based on those provisions, it is possible to release the maintenance performed, as long as the incomplete maintenance is properly identified and communicated to the operator and possibly to CAAT if a disagreement with the operator exists.

Note: refer to MOE chapter 2.16 for further details

4.5 What Does This Mean: "Appropriately Authorised C/S"

In order to issue a CRS, the C/S has to be formally authorised by the maintenance organisation to do so.

The word "appropriately" means that the person can only be authorised when the maintenance organisation has verified compliance with all the applicable qualification requirements and only for the scope of work applicable to that qualification.

Note: refer to Part 5 of this GM for further details

4.6 What Does This Mean: "When it has been Verified that all Maintenance Ordered has been Properly Carried Out"?

This doesn't necessarily mean that C/S have to perform or supervise the whole process of every task, but they do need to:

- assess the complexity of each task

- make sure that the tasks have been assigned to personnel authorised to sign-off to the corresponding level
- coordinate the different tasks
- provide support for the personnel in case of any mistakes or unexpected difficulties
- verify that the job has been completed and signed-off properly

As a consequence, this is not just an administrative task that can be performed from a remote location or without having any involvement. C/S make the final determination on the amount of involvement they would like to perform in order to be satisfied that the maintenance can be properly released. This level of involvement cannot be predefined or limited by the maintenance organisation's procedures.

4.7 In the Case of Base Maintenance, What are the Functions and Responsibilities of "S/S"?

The qualification criteria for RCAB 77 Article 8.A.1 C/S and S/S are identical as both:

- must have an RCAB 77 licence with the corresponding type ratings (or be qualified in accordance with Appendix IV to TCAR Part 145 when applicable)
- must have the same recent experience and continuation training
- must have training in human factors and company procedures
- are subject to the same competence assessment

The only difference is that in the base maintenance environment there is an additional function applicable to the category RCAB 77 Article 8.A.1 C/S. However, this function is more administrative due to the more complex environment.

Regarding the level of involvement of the S/S, TCAR Part 145 states that "RCAB 77 Article 8.A.1 S/S shall ensure that all relevant tasks or inspections have been carried out to the required standard before the category RCAB Article 8.A.1 C/S issues the CRS".

This requirement is of a similar nature to the one contained in TCAR Part 145, 145.A.50(a), where C/S are required to ensure that "it has been verified that all maintenance ordered has been properly carried out". As a consequence, the level of involvement expected from the S/S follows the same principles as indicated above for C/S.

4.8 What is the Function of Personnel Authorised to "Sign-Off"?

TCAR Part 145 requires that, in order to prevent omissions, every task or group of tasks must be signed-off by formally authorised personnel after its completion. It also states that a sign-off is different from a release to service.

Work by unauthorised personnel (temporary staff, trainees, etc.) must be checked by authorised personnel before they sign-off. "They" means authorised personnel (formally authorised to sign-off).

This concept of personnel authorised to sign-off is in line with the provisions related to the assessment of mechanics contained in TCAR Part 145. This assessment should guarantee that "mechanics shall be able to carry out tasks to any standard specified in the maintenance data, and will notify supervisors of mistakes requiring rectification to re-establish required maintenance standards".

Nevertheless, holding a sign-off authorisation doesn't mean that the authorised person can sign-off all tasks. It means that they can sign-off tasks up to the authorised level, depending upon the training and experience held, and in accordance with a procedure described in the MOE.

Furthermore, even if this person is qualified and able to carry out the task to the required standard, this does not mean that C/S and S/S are not needed. The presence of C/S and S/S is an additional safety barrier and has the function of coordinating the different tasks, supporting those mechanics in case of any mistakes or unexpected difficulties and verifying that the job has been completed and signed-off properly.

5. ACCEPTABLE CRS FOLLOWING LINE MAINTENANCE

5.1 Definitions

Refer to Section 4 of this GM for guidance on the definition and meaning of aircraft certificate of release to service.

5.2 Work Order Issued by the Operator

Line maintenance work orders may vary significantly depending upon the operator, ATL system in use, etc., and could be:

- a sequence of different work orders, each one covering a single maintenance task
- a sequence of crew entries in the Aircraft Logbook, which can also be considered as a series of work orders
- a single work order which includes a certain group of maintenance tasks
- a combination of the above

5.3 Possible CRS System for Line Maintenance

A CRS can only be issued by C/S holding certification privileges for all the maintenance tasks covered by the release statement.

The possible CRS scenarios described in the following paragraphs all comply TCAR Part 145.

5.4 Multiple Release Approach

This situation applies when a maintenance event is composed of various work orders and each work order is issued with an individual CRS, resulting in multiple releases associated with the same maintenance event.

In this case, an appropriately authorised RCAB 77 Article 8.A.1 C/S, as applicable, must sign the CRS of the related task.

Examples:

Maintenance Event 1 – 4 different CRS issued in the maintenance event

Work Order 1	Weekly check	CRS 1 issued by an RCAB 77 Article 8.A.1 C/S
Work Order 2	LH engine IDG replacement	CRS 2 issued by an RCAB 77 Article 8.A.1 C/S
Work Order 3	Trouble shooting autopilot 1	CRS 3 issued by an RCAB 77 Article 8.A.1 C/S
Work Order 4	ATL item 1- Hard landing	CRS 4 issued by an RCAB 77 Article 8.A.1 C/S

or

Maintenance Event 2 – 2 different CRS issued in the maintenance event

Work Order 1	Weekly check	CRS 1 issued by an RCAB 77 Article 8.A.1 C/S
	LH engine IDG replacement	
	ATL item 1- Hard landing	

Work Order 2	Trouble shooting autopilot 1	CRS 2 issued by an RCAB 77 Article 8.A.1 C/S

5.5 Single Release Approach

This situation applies when a single CRS is issued covering all the maintenance ordered in a maintenance event. In this case, if the maintenance event includes both mechanical and avionics tasks, the only person who can issue the single CRS is someone holding a RCAB 77 Article 8.A.1 C/S authorisation.

Examples:

Maintenance Event 1 – 1 single CRS issued in the maintenance event

Work Order 1	Weekly check	One single CRS issued by an RCAB 77 Article 8.A.1 C/S
	LH engine IDG replacement	
	Trouble shooting autopilot 1	
	ATL item 1 - Hard landing	

or

Maintenance Event 2 – 1 single CRS issued in the maintenance event

Work Order 1	Perform A check tasks in the tally sheet containing mechanical and avionics tasks	One single CRS issued by an RCAB 77 Article 8.A.1 C/S

5.6 Special Cases

For C/S qualified according to national licensing systems as per TCAR Part 145 Appendix IV, further limitations may apply where the national licensing system does not include full release to service privileges.

6. MINIMUM LINE MAINTENANCE LOCATION SETUP

6.1 Scope and Applicability

Experience shows that maintenance organisations often underestimate the need to have a minimum setup in terms of facilities, tools and equipment when opening a line maintenance location.

A checklist is made available in the following paragraph for the facilities, tools, equipment and materials that should be typically made available at a line maintenance Location. This is to be considered as high-level guidance to be adapted to the size and complexity of the particular line maintenance location.

Note:

- compliance with the checklist does not necessarily mean that the line maintenance location complies with TCAR Part 145 facility, tools, and equipment requirements
- absence of one or more items does not necessarily mean non-compliance with TCAR Part 145, if it can be demonstrated that the particular items are not necessary depending upon the type of aircraft and contracts in place or the same result can be obtained by different means. For example, infrequently used equipment (e.g. elevator access platforms where no routine elevator inspection is necessary at the line maintenance location) do not need to be permanently available, however means must be in place to obtain them when needed
- other TCAR Part 145 requirements apply (e.g. maintenance data, personnel, C/S) which are not included in this document

6.2 Checklist for Minimum Line Maintenance Location Setup

1. C/S and Maintenance Staff Offices Availability:
   - ☐ Enough Space (for studying instructions and filling records)
   - ☐ Computer Terminals and Printers
   - ☐ Staff Means of Transportation to Apron

2. Line Station Communications Means:
   - ☐ Station E-mail
   - ☐ Scanner/Fax
   - ☐ Fixed Phone
   - ☐ C/S Mobile Phones or Radios
   - ☐ Aircraft Contact Radio Frequency
   - ☐ Customers MCC/Main Base Contacts
   - ☐ Customers Flight Schedule System Information

3. Storage Facilities
   - ☐ Storage area for materials and components with racks to hold and segregate serviceable and unserviceable components
   - ☐ Tool crib/storage area

4. Access to the Hangar in case of need
   - ☐ Local Provider Contract/Agreement

5. General Items to be always available (not aircraft specific)
   - ☐ Tire Pressure Manometer
   - ☐ High Pressure Nitrogen Bottles and Pressure Reducer
   - ☐ Means of Transport for Wheels and Brakes
   - ☐ Interphone Headset and Extension Cord
   - ☐ General (Personal) Toolbox
   - ☐ Portable Lights for External Inspection
   - ☐ Digital Tester (Fluke)
   - ☐ Grease Gun
   - ☐ Fuel Drainage Tool and Disposal Tank
   - ☐ Antistatic ESD Wristband
   - ☐ High Speed Tape
   - ☐ Circuit Breaker Collars
   - ☐ Sealants and Fillers for Temporary Repairs
   - ☐ Lock wire (Various Dimensions)
   - ☐ Platforms, Stairs, Ladders for Fuselage/Wings/Tail

A Cherry Picker Car with extendable Platform is recommended to facilitate the most frequent activities (e.g. for engine oil refill)

6. Aircraft specific Items to be typically available for aircraft type in the scope of work

Some of the tools and equipment indicated below are typically provided by the operator. However, when a TCAR Part 145 approval is requested in the absence of an operator, the maintenance organisation remains responsible to comply with the requirement to have available the necessary tools and equipment to perform the approved scope of work. An approval cannot be granted based on intentions to acquire tools and equipment only at the time a contract will be in place.

   - ☐ Tire Inflation Adaptor (Specific Aircraft Tire)
   - ☐ Torque Wrench/Adaptor Sets (Wheels Replacement)
   - ☐ Nose and Main Landing Gear Axle Jack to Lift Aircraft (Wheels Replacement)
   - ☐ Engine/IDG Oil Servicing Pump or Cart
   - ☐ Hydraulic Oil Servicing Pump (If not by design installed on board)
   - ☐ Shock Absorber Servicing Adapter (Air and Oil)
   - ☐ Thrust Reverser Deactivation Pin or Device (If not operator provided or installed on-board or on-board as Fly-Kit)
   - ☐ Starter Valve Manual Operation Tool (If not operator provided or installed on-board or on-board as Fly- Kit)
   - ☐ Pitot static, TAT, AOA Covers (If not operator provided or on-board as Fly-Kit)
   - ☐ Landing Gear Lockpins (If not operator provided or on-board)
   - ☐ Steering Deactivation By-pass Pin (If not operator provided)

7. Aircraft specific items to be typically available after a contract with an operator is signed

Need of availability for the parts listed below at the maintenance organisation depends upon the types of activities included in the contract with the operator, together with requirements for the parts to be available at each line maintenance location where aircraft are operated, in order to reduce possible AOG effects. Some of the items listed may be provided by the operator:

   - ☐ Wheels
   - ☐ Brakes
   - ☐ Engine and IDG Oil

☐ Hydraulic Oil
☐ Engine Oil and Fuel Filter Kit
☐ Oxygen Cylinders (Crew and Portable)
☐ Lamps Kit (External and Internal)
☐ NO-GO Components
☐ Sealants and Fillers for Temporary Repairs

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