NHF Part 145 refresh Course

AMC 145.A.10 Scope

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

(a) Line Maintenance may include:

1. — Trouble shooting.
2. — Defect rectification.
3. — Component replacement with use of external test equipment if required. Component replacement may include components such as engines and propellers.

AMC 145.A.10 Scope

4. — Scheduled maintenance and/or checks including visual inspections that will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick opening access panels/doors.
5. — Minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means.

(b) For temporary or occasional cases (ADs, SBs) the Quality Manager may accept base maintenance tasks to be performed by a line maintenance organisation provided all requirements are fulfilled as defined by the competent authority.

(c) Maintenance tasks falling outside these criteria are considered to be Base Maintenance.

145.A.30 Personnel requirements

The organisation shall appoint an accountable manager who has corporate authority for ensuring that all maintenance required by the customer can be financed and carried out to the standard required by this Part. The accountable manager shall:

1. Ensure that all necessary resources are available to accomplish maintenance in accordance with point 145.A.65(b) to support the organisation approval.
2. Establish and promote the safety and quality policy specified in point 145.A.65(a).
3. Demonstrate a basic understanding of this Annex (Part-145).

145.A.30 Personnel requirements

The organisation shall have a maintenance man-hour plan showing that the organisation has sufficient staff to plan, perform, supervise, inspect and quality monitor the organisation in accordance with the approval.

In addition the organisation shall have a procedure to reassess work intended to be carried out when actual staff availability is less than the planned staffing level for any particular work shift or period.

145.A.30 Personnel requirements

Any organisation maintaining aircraft, shall in the case of aircraft line maintenance, have appropriate aircraft-rated certifying staff qualified as category B1, B2, B2L, B3 and L, as appropriate, in accordance with Annex III (Part-66) and point 145.A.35.

In addition such organisations may also use appropriately task-trained certifying staff holding the privileges set out in points 66.A.20(a)(1) and 66.A.20(a)(3)(ii) and qualified in accordance with Annex III (Part-66) and point 145.A.35 to carry out minor scheduled line maintenance and simple defect rectification.

The availability of such certifying staff shall not replace the need for category B1, B2, B2L, B3 and L certifying staff, as appropriate.

145.A.30 Personnel requirements

Any organisation maintaining aircraft, shall:

- In the case of base maintenance of complex motor-powered aircraft, have appropriate aircraft-type-rated certifying staff, qualified as category C in accordance with Annex III (Part-66) and point 145.A.35.
- In addition, the organisation shall have sufficient aircraft type-rated staff qualified as category B1 and B2, as appropriate, in accordance with Annex III (Part-66) and point 145.A.35 to support the category C certifying staff.

GM 66.A.5 Aircraft groups

Category/subcategory Groups	A, B1 and C	B2
1 — Complex motor-powered aircraft — Multi-engine helicopters — Aeroplanes above FL290 — Aircraft with fly-by-wire systems — Any other aircraft when defined by the Agency	X	X

GM 66.A.20(a) Privileges

A category B1 aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as B1 support staff following:

— maintenance performed on aircraft structure, powerplant and mechanical and electrical systems,

— work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.

GM 66.A.20(a) Privileges

A category B2 aircraft maintenance licence shall permit the holder:

To issue certificates of release to service and to act as B2 support staff for following:

— maintenance performed on avionic and electrical systems, and

— electrical and avionics tasks within powerplant and mechanical systems,

requiring only simple tests to prove their serviceability

GM 66.A.20(a) Privileges

Simple test means a test described in approved maintenance data and meeting all the following criteria:

— The serviceability of the system can be verified using aircraft controls, switches, Built-in Test Equipment (BITE), Central Maintenance Computer (CMC) or external test equipment not involving special training.

— The outcome of the test is a unique go – no go indication or parameter, which can be a single value or a value within an interval tolerance. No interpretation of the test result or interdependence of different values is allowed.

GM 66.A.20(a) Privileges

— The test does not involve more than 10 actions as described in the approved maintenance data (not including those required to configure the aircraft prior to the test, i.e. jacking, flaps down, etc, or to return the aircraft to its initial configuration).

Pushing a control, switch or button, and reading the corresponding outcome may be considered as a single step even if the maintenance data shows them separated.

GM 66.A.20(a) Privileges

Troubleshooting means the procedures and actions necessary, using approved maintenance data, in order to identify the root cause of a defect or malfunction.

It may include the use of BITE or external test equipment.

GM 66.A.20(a) Privileges

The category C licence permits certification of scheduled base maintenance by the issue of a single certificate of release to service for the complete aircraft after the completion of all such maintenance.

The basis for this certification is that the maintenance has been carried out by:

Competent mechanics, and category B1, B2, B2L, B3 and L support staff, as appropriate, and have signed for the maintenance tasks under their respective specialisation.

GM 66.A.20(a) Privileges

The principal function of the category C certifying staff is to ensure that all required maintenance has been called up and signed off by the category B1, B2, B2L, B3 and L support staff, as appropriate, before issue of the certificate of release to service.

Only category C personnel who also hold category B1, B2, B2L, B3 or L qualifications may perform both roles in base maintenance.

145.A.30 Personnel requirements

- Category B1 and B2 support staff shall ensure that all relevant tasks or inspections have been carried out to the required standard before the category C certifying staff issues the certificate of release to service.

- The organisation shall maintain a register of any such category B1 and B2 support staff.

145.A.30 Personnel requirements

- The category C certifying staff shall ensure that compliance has been met and that all work required by the customer has been accomplished during the particular base maintenance check or work package,

- Assess the impact of any work not carried out, with a view to either requiring its accomplishment or agreeing with the operator to defer such work to another specified check or time limit.

AMC 145.A.30(d) Personnel requirements

Has *sufficient staff* means that the organisation employs or contracts competent staff, as detailed in the man-hour plan.

At least **half** the staff that perform maintenance in *each workshop, hangar or flight line on any shift* should be employed to ensure organisational stability.

AMC 145.A.30(d) Personnel requirements

For the purpose of meeting a specific operational necessity, a temporary increase of the proportion of contracted staff may be permitted to the organisation by the **competent authority.**

In accordance with an approved procedure which should describe the extent, specific duties, and responsibilities for ensuring adequate organisation stability.

AMC 145.A.30(d) Personnel requirements

The maintenance man-hour plan should take into account all maintenance activities carried out outside the scope of the Part-145 approval.

The planned absence (for training, vacations, etc.) should be considered when developing the man-hour plan.

AMC 145.A.30(d) Personnel requirements

The maintenance man-hour plan should relate to the anticipated maintenance work load except that when the organisation cannot predict such workload.

Due to the short term nature of its contracts, then such plan should be based upon the minimum maintenance workload needed for commercial viability.

AMC 145.A.30(d) Personnel requirements

Maintenance work load includes all necessary work such as, but not limited to:

- Planning,
- Maintenance record checks,
- Production of worksheets/cards in paper or electronic form,
- Accomplishment of maintenance,
- Inspection and the completion of maintenance records.

AMC 145.A.30(d) Personnel requirements

In the case of aircraft base maintenance, the maintenance man-hour plan should relate to the aircraft hangar visit plan as specified in AMC 145.A.25(a).

In the case of aircraft component maintenance, the maintenance man-hour plan should relate to the aircraft component planned maintenance as specified in 145.A.25(a)(2).

AMC 145.A.30(d) Personnel requirements

The maintenance man-hour plan should be reviewed at least every 3 months and updated when necessary.

Significant deviation from the maintenance man-hour plan should be reported through the departmental manager to the quality manager and the accountable manager for review.

Significant deviation means more than a 25% shortfall in available man-hours during a calendar month for any one of the functions specified in 145.A.30(d).

AMC1 145.A.30(e) Personnel requirements

Competence should be defined as a measurable skill or standard of:

- Performance,
- Knowledge and understanding,
- Taking into consideration Attitude and Behaviour.

The referenced procedure requires amongst others that planners, mechanics, specialised services staff, supervisors, certifying staff and support staff, whether employed or contracted, are assessed for competence before unsupervised work commences and competence is controlled on a continuous basis.

AMC1 145.A.30(e) Personnel requirements

Competence should be assessed by evaluation of:

- On-the-job performance and/or testing of knowledge by appropriately qualified personnel,
- Records for basic, organisational, and/or product type and differences training,
- Experience records.

AMC1 145.A.30(e) Personnel requirements

In respect to the understanding of the application of human factors and human performance issues, all maintenance organisation personnel should have received an initial and continuation human factors training.

AMC1 145.A.30(e) Personnel requirements

This should concern to a minimum:

— Post-holders, managers, supervisors;

— Certifying staff, support staff and mechanics;

— Technical support personnel such as planners, engineers, technical record staff;

— Quality control/assurance staff;

— Specialised services staff;

— Human factors staff/human factors trainers;

— Store department staff, purchasing department staff;

— Ground equipment operators

AMC1 145.A.30(e) Personnel requirements

The purpose of human factors continuation training is primarily to ensure that staff remain current in terms of human factors and also to collect feedback on human factors issues.

Consideration should be given to the possibility that such training has the involvement of the quality department.

There should be a procedure to ensure that feedback is formally passed from the trainers to the quality department to initiate action where necessary.

AMC1 145.A.30(e) Personnel requirements

Human factors continuation training should be of an appropriate duration in each two year period in relation to relevant quality audit findings and other internal/external sources of information on human errors in maintenance available to the organisation.

AMC1 145.A.30(e) Personnel requirements

Human factors training may be conducted by the maintenance organisation itself, or independent trainers, or any training organisations acceptable to the competent authority.

The human factors training procedures should be specified in the maintenance organisation exposition.

GM2 145.A.30(e) Competence assessment procedure

ED Decision 2020/002/R

The organisation should develop a procedure describing the process of competence assessment of personnel.

The procedure should specify:

— persons responsible for this process,

— when the assessment should take place,

— credits from previous assessments,

— validation of qualification records,

GM2 145.A.30(e) Competence assessment procedure

ED Decision 2020/002/R

— means and methods for the initial assessment,

— means and methods for the continuous control of competence including feedback on personnel performance,

— competences to be observed during the assessment in relation with each job function,

— actions to be taken when assessment is not satisfactory,

— recording of assessment results.

AMC 145.A.30(h) Personnel requirements

In accordance with 145.A.30(h) and 145.A.35, the qualification requirements (basic licence, aircraft ratings, recent experience and continuation training) are identical for certifying staff and for support staff.

The only difference is that support staff cannot hold certification privileges when performing this role since during base maintenance the release to service will be issued by category C certifying staff.

Nevertheless, the organisation may use as support staff (for base maintenance) persons who already hold certification privileges for line maintenance.

145.A.35 Certifying staff and support staff

In addition to the requirements of points 145.A.30(h), the organisation shall ensure that certifying staff and support staff have an adequate understanding of the relevant aircraft or components, or both, to be maintained and of the associated organisation procedures.

In the case of certifying staff, this shall be accomplished before the issue or reissue of the certification authorisation.

145.A.35 Certifying staff and support staff

'Support staff' means those staff holding an aircraft maintenance licence under Annex III (Part-66) in category **B1, B2, B2L, B3 and/or L** with the appropriate aircraft ratings, working in a base maintenance environment while not necessarily holding certification privileges.

'Relevant aircraft and/or components', means those aircraft or components specified in the particular certification authorisation.

145.A.35 Certifying staff and support staff

‘Certification authorisation’ means the authorisation issued to certifying staff by the organisation and which specifies the fact that those staff may sign certificates of release to service within the limitations stated in such authorisation on behalf of the approved organisation.

145.A.35 Certifying staff and support staff

The organisation shall ensure that all certifying staff and support staff are involved in at least 6 months of actual relevant aircraft or component maintenance experience in any consecutive 2- year period.

For the purpose of this point *'involved in actual relevant aircraft or component maintenance'* means that the person has worked in an aircraft or component maintenance environment and has either exercised the privileges of the certification authorisation and/or has actually carried out maintenance on at least some of the aircraft type or aircraft group systems specified in the particular certification authorisation.

145.A.35 Certifying staff and support staff

The organisation shall ensure that all certifying staff and support staff receive sufficient continuation training in each two year period to ensure that such staff have up-to-date knowledge of relevant technology, organisation procedures and human factor issues.

145.A.35 Certifying staff and support staff

The organisation shall establish a programme for continuation training for certifying staff and support staff, including a procedure to ensure compliance with the relevant points of 145.A.35 as the basis for issuing certification authorisations under this Part to certifying staff, and a procedure to ensure compliance with Annex III (Part-66).

145.A.35 Certifying staff and support staff

The organisation shall assess all prospective certifying staff for their competence, qualification and capability to carry out their intended certifying duties in accordance with their Company MOE.

145.A.48 Performance of maintenance

The organisation shall establish procedures to ensure that:

(a) after completion of maintenance a general verification is carried out to ensure that the aircraft or component is clear of all tools, equipment and any extraneous parts or material, and that all access panels removed have been refitted;

(b) an error capturing method is implemented after the performance of any critical maintenance task;

145.A.48 Performance of maintenance

(c) the risk of multiple errors during maintenance and the risk of errors being repeated in identical maintenance tasks are minimised; and,

(d) damage is assessed and modifications and repairs are carried out using data specified in point M.A.304 of Annex I (Part-M) or ML.A.304 of Annex Vb (Part-ML), as applicable.

GM 145.A.48 Performance of maintenance

AUTHORISED PERSON

An ‘authorised person’ is a person formally authorised by the maintenance organisation to perform or supervise a maintenance task.

An ‘authorised person’ is not necessarily ‘certifying staff’.

GM 145.A.48 Performance of maintenance

SIGN-OFF

A ‘sign-off’ is a statement issued by the ‘authorised person’ which indicates that the task or group of tasks has been correctly performed.

A ‘sign-off’ relates to one step in the maintenance process and is, therefore, different to a certificate of release to service.

AMC4 145.A.48(b) Performance of maintenance

The procedure should identify the error-capturing methods:

- The critical maintenance tasks,
- The training and qualification of staff applying error-capturing methods,
- How the organisation ensures that its staff is familiar with critical maintenance tasks and error-capturing methods.

AMC4 145.A.48(b) Performance of maintenance

CRITICAL MAINTENANCE TASKS

(a) The procedure should ensure that the following maintenance tasks are reviewed to assess their impact on flight safety:

(1) tasks that may affect the control of the aircraft flight path and attitude, such as installation, rigging and adjustments of flight controls;

(2) aircraft stability control systems (autopilot, fuel transfer);

AMC4 145.A.48(b) Performance of maintenance

CRITICAL MAINTENANCE TASKS

(3) tasks that may affect the propulsive force of the aircraft, including installation of aircraft engines, propellers and rotors; and

(4) overhaul, calibration or rigging of engines, propellers, transmissions and gearboxes.

AMC4 145.A.48(b) Performance of maintenance

(b) The procedure should describe which data sources are used to identify critical maintenance tasks.

Several data sources may be used, such as:

(1) information from the design approval holder;

(2) accident reports;

(3) investigation and follow-up of incidents;

AMC4 145.A.48(b) Performance of maintenance

(4) occurrence reporting;

(5) flight data analysis;

(6) results of audits;

(7) normal operations monitoring schemes; and

(8) feedback from training.

AMC4 145.A.48(b) Performance of maintenance

ERROR-CAPTURING METHODS

(a) Error-capturing methods are those actions defined by the organisation to detect maintenance errors made when performing maintenance.

(b) The organisation should ensure that the error-capturing methods are adequate for the work and the disturbance of the system.

A combination of several actions (visual inspection, operational check, functional test, rigging check) may be necessary in some cases.

AMC4 145.A.48(b) Performance of maintenance

INDEPENDENT INSPECTION

Independent inspection is one possible error-capturing method.

What is an independent inspection?

An independent inspection is an inspection performed by an ‘independent qualified person’ of a task carried out by an ‘authorised person’, taking into account that:

AMC4 145.A.48(b) Performance of maintenance

INDEPENDENT INSPECTION

1. the **‘authorised person’** is the person who performs the task or supervises the task and they assume the full responsibility for the completion of the task in accordance with the applicable maintenance data;

2. the **‘independent qualified person’** is the person who performs the independent inspection and attests the satisfactory completion of the task and that no deficiencies have been found.

The ‘independent qualified person’ does not issue a certificate of release to service, therefore they are not required to hold certification privileges;

AMC4 145.A.48(b) Performance of maintenance

(3) the ‘authorised person’ issues the certificate of release to service or signs off the completion of the task after the independent inspection has been carried out satisfactorily;

(4) the work card system used by the organisation should record the identification of both persons and the details of the independent inspection as necessary before the certificate of release to service or sign-off for the completion of the task is issued.

AMC4 145.A.48(b) Performance of maintenance

(b) **Qualifications of persons performing independent inspections**

The organisation should have procedures to demonstrate that the ‘independent qualified person’ has been trained and has gained experience in the specific inspection to be performed.

The organisation could consider making use of, for example:

(1) staff holding a certifying staff or support staff or sign-off authorisation or equivalent necessary to release or sign off the critical maintenance task;

AMC4 145.A.48(b) Performance of maintenance

(2) staff holding a certifying staff or support staff or sign-off authorisation or equivalent necessary to release or sign off similar task in a product of similar category and having received specific practical training in the task to be inspected;

(3) a commander holding a limited certification authorisation in accordance with 145.A.30(j)(4) and having received adequate practical training and having enough experience in the specific task to be inspected and on how to perform independent inspection.

AMC4 145.A.48(b) Performance of maintenance

(c) How to perform an independent inspection

An independent inspection should ensure correct assembly, locking and sense of operation.

When inspecting control systems that have undergone maintenance, the independent qualified person should consider the following points independently:

(1) all those parts of the system that have actually been disconnected or disturbed should be inspected for correct assembly and locking;

AMC4 145.A.48(b) Performance of maintenance

(c) How to perform an independent inspection

(2) the system as a whole should be inspected for full and free movement over the complete range;

(3) cables should be tensioned correctly with adequate clearance at secondary stops;

AMC4 145.A.48(b) Performance of maintenance

(4) the operation of the control system as a whole should be observed to ensure that the controls are operating in the correct sense;

(5) if different control systems are interconnected so that they affect each other, all the interactions should be checked through the full range of the applicable controls; and

(6) software that is part of the critical maintenance task should be checked, for example: version, compatibility with aircraft configuration.

AMC4 145.A.48(b) Performance of maintenance

(d) What to do in unforeseen cases when only one person is available

REINSPECTION:

(1) Reinspection is an error-capturing method subject to the same conditions as an independent inspection is, except that the ‘authorised person’ performing the maintenance task is also acting as ‘independent qualified person’ and performs the inspection.

AMC4 145.A.48(b) Performance of maintenance

(2) Reinspection, as an error-capturing method, should only be performed in unforeseen circumstances when only one person is available to carry out the task and perform the independent inspection.

The circumstances cannot be considered unforeseen if the person or organisation has not assigned a suitable ‘independent qualified person’ to that particular line station or shift.

AMC4 145.A.48(b) Performance of maintenance

(3) The certificate of release to service is issued after the task has been performed by the ‘authorised person’ and the reinspection has been carried out satisfactorily.

The work card system used by the organisation should record the identification and the details of the reinspection before the certificate of release to service for the task is issued.

AMC 145.A.48(c) Performance of maintenance

The procedures should be aimed at:

(a) minimising multiple errors and preventing omissions.

Therefore, the procedures should specify:

(1) that every maintenance task is signed off only after completion;

(2) how the grouping of tasks for the purpose of sign-off allows critical steps to be clearly identified; and

(3) that work performed by personnel under supervision (i.e. temporary staff, trainees) is checked and signed off by an authorised person;

AMC 145.A.48(c) Performance of maintenance

(b) minimising the possibility of an error being repeated in identical tasks and, therefore, compromising more than one system or function.

Thus, the procedures should ensure that no person is required to perform a maintenance task involving removal/installation or assembly/disassembly of several components of the same type fitted to more than one system.

A failure of which could have an impact on safety, on the same aircraft or component during a particular maintenance check.

However, in unforeseen circumstances when only one person is available, the organisation may make use of reinspection as described in point (d) of AMC4 145.A.48(b).

GM 145.A.48(c) Performance of maintenance

To minimise the risk of multiple errors or errors being repeated, the organisation may implement:

— procedures to plan the performance by different persons of the same task in different systems;

— independent inspection or re-inspection procedures.

THANK YOU

ANY QUESTIONS?