GUERNSEY ADVISORY CIRCULARS (GACs)

GAC AIR-15 FABRICATION OF PARTS

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1 Purpose

This Circular provides information regarding the Fabrication of Parts in accordance with GAR 21.303, and guidance material designed to assist the applicant in obtaining permission for their maintenance organisation to fabricate a restricted range of parts to be used during maintenance within its own facilities, in accordance with a procedure approved in its Maintenance Organisation Exposition (MOE).

This guidance is only intended to cover the fabrication of parts by a GAR 145 maintenance organisation, and it cannot be used in any way to support the manufacture of parts.

2 Related Laws, Regulations and Requirements

This Circular relates to:

- GAR Parts 21 (Subpart K, 21.303) and 145 (Subpart A, 145.11, Subpart C, 145.55, 145.59.).

No rights can be derived from this document. For exact details please refer to The Air Navigation (Bailiwick of Guernsey) Law, 2012. In case of conflict between this guidance document and the Law, the latter shall prevail.

3 Definitions

Definitions, in the context of this GAC shall have the meanings listed in GAR Part 1 (Definitions, Abbreviations and Units of Measurement).

3.1 “Fabrication of parts”: The term “fabrication” is to be used in the GAR 145 environment to identify a restricted production under the limitations of this GAC.

3.2 “Manufacture of parts”: The term “manufacture” is to be used with reference to the mass production of parts.

4 Introduction - Fabrication of Parts under GAR 21.303

GAR 21.303 and this GAC provide for the DirectorDCA to permit a maintenance organisation to fabricate a restricted range of parts to be used during maintenance within its own facilities, in accordance with a procedure approved in its Maintenance Organisation Exposition (MOE).

In this guidance, the term 'maintenance organisation' shall be replaced by 'fabricating organisation,' for clarity. It is not the intent of GAR 21.303 to provide an alternative means to manufacture parts outside an approved production organisation. To clearly distinguish activities, the definitions as defined in this GAC para 3 'Definitions', have been adopted.

5 General Principles for Fabrication of Parts

When considering fabrication of parts under GAR 21.303, the following principles apply:

a) an Option 1 GAR 145 organisation may only fabricate parts in accordance with the privileges and procedures approved by its GAR 21.25(a)(1) host authority

a. an Option 2 GAR 145 organisation may only fabricate parts in accordance with the privileges approved by the Director DCA in its MOE in accordance with the guidance in this GAC.

5.1 The permission to fabricate parts is to be agreed by the Director DCA through a detailed MOE procedure. When considering fabrication of parts under a GAR 145 approval, the following general principles apply:

a) each time there is a requirement to fabricate a part or batch of parts, the fabricating organisation must state the justification for not acquiring original parts e.g. obsolescence, excessive lead-times, etc. Fabrication should not be driven by cost if OEM spares are available

b) the fabricating organisation shall provide evidence of sufficient data to fabricate the part. This should already exist in the current issue of the approved maintenance data, i.e. the CMM or AMM refers or describes the fabrication process and/or drawings to be used. Typically, this is the case described under 'Fabrication file', paragraph 8.2, points a and b:,or

c) the fabricating organisation shall provide evidence of direct authorisation received from the design approval holder to fabricate those specific parts, which shall also include the identification of the fabrication data (drawing) to be used. Typically, this is the case described under 'Fabrication file', paragraph 8.2, point c.

5.2 The fabrication is to be performed during the course of aircraft maintenance. This implies that:

b. fabricated items may only be installed on products and/or components, undergoing maintenance in the fabricating organisation's scope of approval and at its own GAR 145 facilities, wherever their location
c. the long-term storage of fabricated parts is not permitted. This means they may be only stored for a limited time as justified by the duration of the on-going maintenance for which they have been fabricated (or by written agreement with the organisation's Designated Civil Aviation Safety Inspector for a longer period if a series of aircraft in the maintenance facility require fabricated parts to satisfy an AD or SB)

a) the item is fabricated under an approved rating (e.g., as part of the maintenance conducted on aircraft, engines or components under the respective rating)

b) the fabrication of parts shall be done within the fabricating organisation`s facilities

c) the fabricating organisation may subcontract special processes (refer appendix 2 for requirements of subcontracting) but may not subcontract the overall fabrication process *

d) If a subcontracting organisation does not have an acceptable approval to release the work performed and any element of that work cannot be verified by later inspection, then an appropriately qualified inspector from the GAR 145 organisation must be present during the subcontracted work/process

Note: * Subcontracting the entire fabrication of parts may be accepted on the additional condition that the fabricating organisation routinely performs several fabrications, in house, within the scope intended to be conducted. This shall ensure the fabricating organisation maintains the necessary experience.

5.3 The fabricated parts do not qualify for individual certification with a Guernsey Authorised Release Certificate. Permission to fabricate does not constitute approval for manufacture, or to supply externally.

5.4 The fabrication of the following type of parts is not permitted:

a. critical parts (as defined by the design approval holder)
b. complete primary structure

6 Scope of Fabrication of Parts

6.1 To allow the fabrication of parts, under GAR145 approval, the related fabrication, inspection, assembly, and test should fall clearly within the technical and procedural capability of the fabricating organisation.

6.2 The capability to fabricate parts shall be defined through the MOE "Scope of Work," and shall specify if the permission for fabrication of parts is included or is not applicable.

6.3 When the permission is included, the MOE "Scope of Work,", "Fabrication of Parts" section shall further describe the parts fabrication procedure in compliance with this GAC.

7 Identification of Fabrication Groups

7.1 Fabrication under the GAR 145 approval can include, but is not limited to, the following "fabrication groups":

a) Fabrication of bushes, sleeves and shims

b) Fabrication of secondary structural elements

c) Fabrication of control cables

d) Fabrication of flexible and rigid pipes

e) Fabrication of electrical cable looms and assemblies

f) Formed or machined sheet metal panels for repairs

g) Additional cases as agreed by the Director*(see 1.15 below).

7.2 The "fabrication groups" shall be identified in the MOE and limited to those for which the fabricating organisation is able to demonstrate effective technical capability.

7.3 The Director may agree for additional "fabrication groups" to be identified. Elements of a primary structural part (such as skin panels or a bracket for a circumferential frame) could also be considered, but this may depend on how such elements are considered by the design approval holder in terms of criticality.

7.4 Any such additional fabrication groups shall be carefully assessed by the fabricating organisation with the involvement, when necessary, of the design approval holder to support the agreement with the Director to allow fabrication. The Director shall be informed via the assigned Designated Civil Aviation Inspector in writing when use is made of this option.

8 Fabrication File & Fabrication Data

8.1 All necessary data to fabricate the part, shall be approved by either the type certificate holder (TCH) or the design organisation approval holder, or supplemental type certificate holder (STCH).

8.2 For this guidance, any of the following may be considered acceptable data for fabrication of parts by the fabricating organisation;

a) Instructions for continuing airworthiness issued by the TCH, STCH or any other organisation required to publish such data; such as an FAA Technical Standing Order (TSO) or ETSO (European Technical Standard Order) holder. This case typically includes fabrication procedures directly provided in maintenance data such as AMM, SRM, CMM, Overhaul or Repair Manuals, ESM, or SB.

b) Modification and/or repair data, involving the fabrication of parts, issued by the TCH, STCH or any other organisation required to publish such data; such as an FAA Technical Standing Order (TSO) or ETSO (European Technical Standard Order) holder. This case typically refers to data in support of repairs or modifications, which are not already included in available approved data (such as structural damages outside the limits of the SRM)

c) Manufacturing drawings (see notes below) for items specified in aircraft, engines, component parts lists, directly provided or made available by a TCH, STCH or an approved production organisation, which is not referred to in other maintenance data (such as AMM or SB). As already specified under ‘General principles of fabrication of parts’, in this case a direct authorisation received from the design approval holder to fabricate those specific parts is necessary; the direct authorisation shall also include the identification of the fabrication data (drawing) to be used.

Note 1: A particular case may be un-dimensioned drawings such as “loft drawing.” These are full size drawings of the part to be fabricated (e.g., some older technology aircraft did not have original dimensional drawings. In these cases, where often multiple compound curves are involved, a “loft drawing” of the item was prepared and was the only means to produce parts).

Note 2: Such fabrication of parts to pattern may be acceptable provided that an engineering drawing of the item is produced, which includes any necessary fabrication processes. However, considering the peculiarity of such cases, the production organisation is expected to support fabrication. The Director shall review these on a case-by-case basis.

8.3 The maintenance organisation shall ensure that the data to fabricate parts:

a) Falls within one of the cases identified above

b) Is applicable to the part to be fabricated.

c) Is up to date, legally obtained and respects proprietary data protection; the intent of this is specifically to prevent the maintenance organisations from reverse engineering parts when they do not have legitimate access to the approved design data.

d) Includes all necessary information of part numbering, dimensions with tolerances, materials, processes, and any special manufacturing techniques, special raw material specification and/or incoming inspection requirement.

Note: TCH communications, such as a Non-Technical Objection, cannot be considered maintenance data for parts fabrication.

9 Fabrication Process – work card/worksheet system

9.1 The fabrication process shall be included in the work card/worksheet system (including worksheets, process sheets and engineering instructions). For any given fabrication process, the relevant GAR 145 work card/worksheet shall contain:

a) References to the fabrication maintenance data, required tooling, part numbering, dimensions with tolerances, incoming inspection requirement, raw material specification and traceability, detailed fabrication processes, any special manufacturing techniques, marking instructions, intermediate and final inspections or testing.

b) Identification of the processes which are subcontracted and related specific inspections by the maintenance organisation.

9.2 Work cards/worksheets will be used to split the data into clear stages of work instructions for maintenance personnel and shall be subject to a control procedure, which shall:

a) Define the responsibilities within the fabricating organisation for the development of instructions, in compliance with the acceptable data for fabrication described in section 1 above

b) Define the traceability of such instructions to each individual fabricated part

c) Ensure that each fabricated part is unambiguously linked to a specific product or component undergoing maintenance. The receiving assembly shall be clearly identified in the worksheet/work card (for example, fabricated for a/c MSN, for Landing Gear s/n XXXX).

10 Composition of the Fabrication File

10.1 To support and record the fabrication process, a standard "fabrication file" is to be used for each part and will comprise the following:

a) The fabrication data described above

b) The fabrication process - work card/worksheet system described above

c) The final inspection and conformity statement as described below

10.2 The fabrication file will constitute the maintenance records specified under 'Fabrication records' in this guidance.

11 Final Inspection and Conformity Statement

11.1 The work card/worksheet shall include the final inspection and associated conformity statement.

11.2 The final inspection stage is required at the completion of the fabrication and shall be conducted independently from the fabrication itself. In addition, the final inspection shall be conducted prior to the installation of the fabricated part.

11.3 The final inspection shall be carried out by an appropriately authorised engineer and consist of the following elements:

a) Check for compliance to the MOE procedure related to the fabrication of parts

b) Check completion of the fabrication file (refer to the following section)

c) Physical inspection of the part to confirm the conformance to the approved fabrication data (see note below).

Note: Applicable dimensions or data (critical or relevant for fit, form, function and material) must be measured and recorded during the final inspection stage, confirming that the part complies with the approved fabrication data. A check box document declaring conformity is not considered acceptable.

11.4 The results of the final inspection shall be recorded and formalised through a dedicated form (which cannot be an Authorised Release Certificate), or directly inside the work card/worksheet system, provided it is clearly distinguished from the fabrication stages; The final inspection records shall

contain reference to the following statement “part(s) fabricated as per MOE fabrication procedure reference XXXX”.

12 Fabrication Inspection System

12.1 The fabricating organisation shall establish a Fabrication Inspection System to ensure that all fabrication processes, whether performed by the fabricating organisation or by subcontractors under its control, are conducted strictly in accordance with the specifications required by the fabricating data, ensuring as a minimum:

a) The availability of personnel, with defined qualifications, including suitable experience and training, who are formally authorised by the fabricating organisation to:

   i. undertake the necessary engineering functions to fabricate the part, such as but not limited to, developing the data described under ‘Fabrication file’, ‘Fabrication Data’.

   ii. sign-off the accomplishment of the fabrication process, including the final inspection stage. Special attention should be paid to tasks requiring specialised knowledge and skill (such as NDT/NDI or welding).

b) A system for the control and authorised amendment of all data provided for the fabrication, inspection, and test to ensure that:

   i. it is complete and up to date at the point of use, readily available to fabrication and inspection personnel.

   ii. during execution, all works are accompanied by documentation giving either directly or by means of appropriate references, the description of the works as well as the identification of the personnel in charge of inspection and execution tasks for each of the different work phases.

   iii. each part is inspected in a way that identifies the nature of all inspections required and the fabrication stages at which they occur (fabrication work cards with clear inspection stages, such as dimensional checks and NDT).

c) A system to control the subcontracted fabrication steps, where appropriate.

d) Procedures to deal with non-conforming parts, identified during the fabrication process. Such parts shall be treated as “unsalvageable” and identified, segregated, and disposed of in such a way as to preclude any further use (such as mutilation by grinding or burning).

e) The means to achieve adequate configuration control of fabricated parts, to enable the maintenance organisation to make the final determination and identification of conformity and eligibility status.

f) Incoming materials used in the finished product are properly identified (including traceability) as specified in the fabrication data.

g) Parts in process are duly identified and segregated as being fabricated parts.

13 Part Marking

13.1 General - Any fabricated part shall be marked according with the instructions provided in the approved data for fabrication, including:

a) A part number

b) The maintenance organisation`s identity

13.2 The main criteria to establish how and by which means the part shall be marked shall be based on the information available in the approved data marking field, possible depth and/or means, actual text or symbols to be used).

13.3 By derogation from the above, in cases where it is impractical to mark the fabricated part without compromising the airworthiness (integrity) of the part or not enough space for the marking information is available, due to the size/shape issues, the documentation accompanying the part shall include the information that could not be marked on the part. In this case the use of a label is recommended.

14 Fabrication Part Number Identification

14.1 For standardisation and traceability purposes of parts fabricated by maintenance organisations, the following standard is recommended to be used to identify the “fabrication P/N”:

a) Original Part Number (mandatory): part number provided in the approved fabrication data.

b) Maintenance organisation identification (mandatory): 2-REG.145.XXXX (*see note below).

c) Additional maintenance organisation identification codes (optional): additional digits (number and/or letters) may be added according to criteria specified in the MOE to facilitate the part traceability year of manufacture, workshop, location, batch number).

14.2 Therefore, the “fabrication P/N” is identified by the digits: A+B+C.

14.3 The following is an explanatory example of the Fabrication Part Number: [Original P/N] 2-REG.145.XXXX* 2024 JUL [Workshop/Location/Batch digits if required].

*Note: “XXXX” to be replaced by the GAR 145 approval number of the maintenance organisation fabricating the parts.

14.4 Special attention should be given to the fact that any symbol or digit included in a part number identification (point, comma or dash.) is to be considered an integral part of the P/N and difference shall be made between lowercase and capital letters. Therefore, the P/N identification marked on the part shall exactly reflect the P/N stated in the documentation accompanying the part.

15 Fabrication Records – General

15.1 The fabrication records constitute objective evidence that:

a) All the prescribed stages of the fabrication process have been satisfactorily completed.

b) Compliance with the approved data for fabrication has been achieved.

c) Traceability from the part to the approved data is ensured.

15.2 Therefore, the maintenance organisation shall implement a system for the completion and retention of records during all stages of fabrication appropriate to the nature of the part and its fabrication processes.

15.3 The record retention procedure shall:

a) Describe the organisation of the archiving system (location, paper/electronic format, responsibility)

b) Clarify conditions for access to the information (e.g. by P/N-batch of the fabricated parts, or by identification of the component/engine/aircraft on which the fabricated part is installed)

c) Ensure that, when a subcontractor is used the records retention function is not subcontracted, and the records are duly retained by the maintenance organisation.

15.4 The fabrication records are composed by the documents described in paragraphs that follow.

16 Fabrication File Record

16.1 The “fabrication file” shall be kept for each part or batch in compliance with records retention time provided in GAR 145.117(b). Particular attention shall be made to the fact that the time retention period is not counted from the date of fabrication but the date of release to service of the product or component on which the fabricated part is installed.

17 List of Parts Fabricated

17.1 The maintenance organisation shall have a system (such as a paper register or database) allowing a listing of all the parts/batches which have been fabricated by the maintenance organisation together with the information of the product/component on which those parts have been installed. The following minimum information needs to be recorded:

a) Fabrication group.

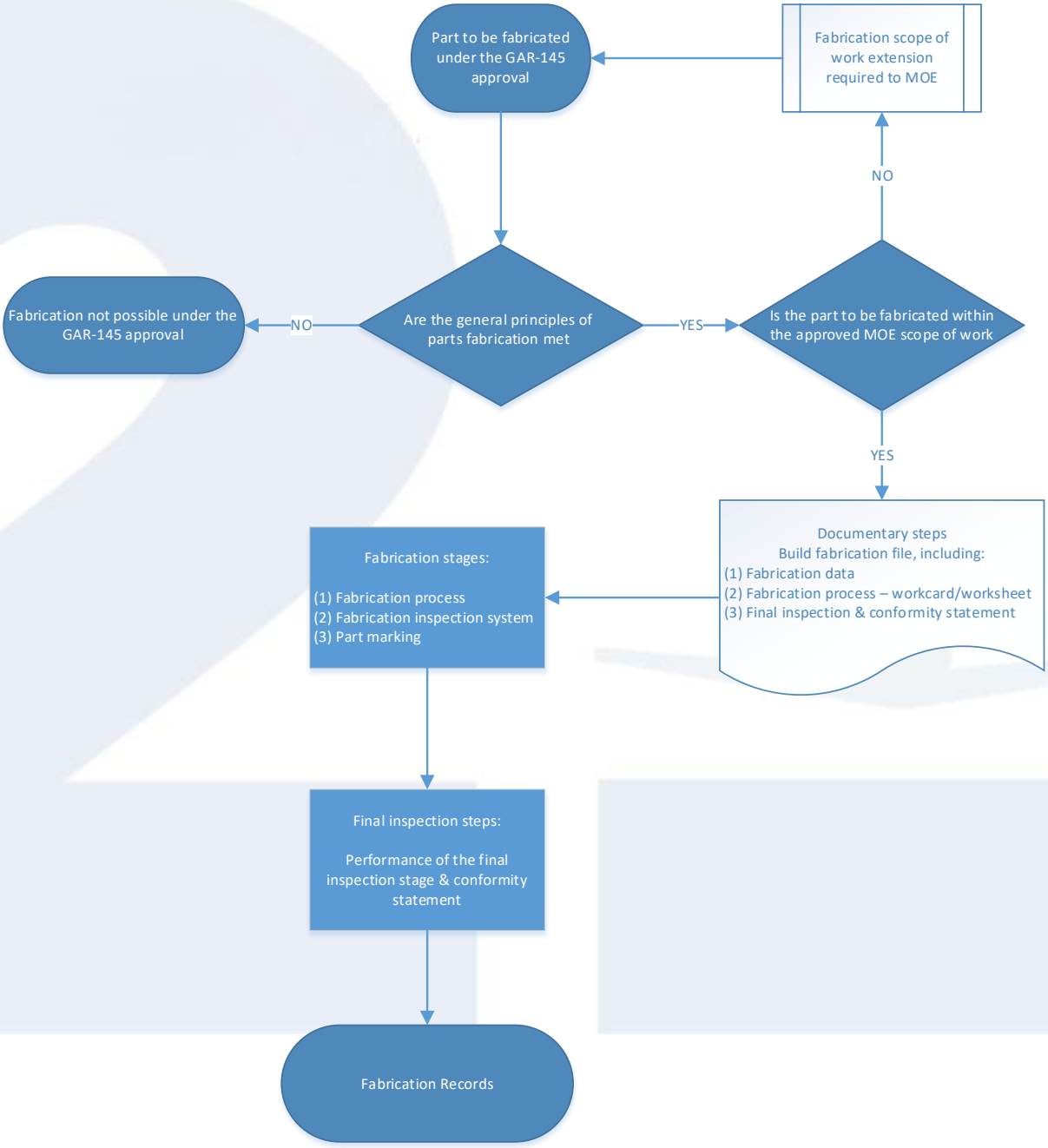
b) Part description.

c) Original Part Number (P/N).

d) Fabrication P/N (For the identification of the Fabrication P/N refer to ‘Part marking” section above).

e) Approved data for fabrication (refer to the Fabrication Data section above).

Appendix 1 – Fabrication Process



Flow Chart Notes on next page

Notes relating to the flow chart:

Parts to be fabricated under the Part 145 approval:

Are the general principles of parts fabrication met? If not, the organisation cannot fabricate the parts.

Is the part to be fabricated within the approved MOE Scope of Work? If not, the AMO will need to revise their MOE Scope of Work, introduce procedures for fabrication, and submit an MOE amendment to the Director for approval.

If the parts to be fabricated are within the MOE Scope of Work, the organisation will need to build the 'Fabrication File', this must contain the following information:

- The fabrication data.
- The fabrication process work card/worksheets.
- The final inspection and conformity statement.

Following creation of the 'Fabrication File' the organisation may fabricate the part using the following fabrication steps:

- The fabrication process.
- The fabrication inspection system.
- Part marking.

After the part has been fabricated, an authorised person from the AMO shall perform the final inspection, and if satisfactory, complete the conformity statement. All records associated with the fabrication of the part shall be retained by the organisation in accordance with its MOE procedure.

Appendix 2 Subcontracting Special Processes

Subcontracting special processes as part of the MOE fabrication procedure is allowed, but the overall fabrication process remains the responsibility of the maintenance organisation, and therefore falls under the compliance oversight of the maintenance organisation. A special process is a process that would not reasonably fall within the maintenance organisation capability.

Contracting the complete process, or part of the process is not allowed because the certification of the fabricated item will then fall outside of the maintenance organisation compliance.

The most common reasons for allowing an organisation approved under GAR 145 to subcontract are:

a) to permit acceptance of certain maintenance tasks carried out by subcontractors, when approvals by the Director of those subcontractors are not justified (e.g. limited scope of work, limited volume of maintenance activities, limited number of potential customers, limited need in time) or,

b) when the subcontractors cannot demonstrate compliance with all elements of the regulation (e.g. no maintenance facilities, specialised staff not covering all maintenance scope). GAR 145.11(b) refers.

Subcontracting permits the acceptance of the following in relation to fabrication:

a) specialised maintenance services, such as, but not limited to, surface treatment (e.g. plating, plasma spraying), fabrication of specified parts for repairs/ modifications, welding, etc.

b) component maintenance.

When subcontracted maintenance processes are carried out under the management system of a GAR 145, it means that for the duration of such maintenance, the GAR 145 approval has been temporarily extended to include the subcontractor. It therefore follows that all parts of the subcontractor (facilities, personnel, equipment and tools, components, maintenance data and procedures) involved with the maintenance organisation's products undergoing maintenance should meet GAR 145 requirements and the GAR 145 organisation's MOE for the duration of that maintenance. It remains the GAR 145 organisation's responsibility to ensure such requirements are satisfied.

When subcontracting, the GAR 145 organisation is not required to have complete facilities for the maintenance that it needs to subcontract, but it should have its own expertise to determine whether the subcontractor meets the necessary standards.

The organisation may find it necessary to include specialised subcontractors to enable it to be approved to issue the Certificate of Release to Service for particular maintenance. The GAR 145 organisation's compliance manager will need to be satisfied that the GAR 145 organisation has the necessary expertise and procedures to control such subcontractors.

A maintenance organisation working outside the scope of its terms of approval is deemed to be not approved for the work considered. Such an organisation may in this circumstance operate only as a subcontractor under the management system and control of another organisation appropriately approved under GAR 145.

Authorisation to sub-contract is indicated by the Director approving the MOE containing a specific procedure on the control of subcontractors as well as a list of subcontractors.

END