



## CHAPTER 14 Modifications and Repairs Approval

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## 1.0 PURPOSE

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**This Chapter is issued to provide guidance to inspectors when assessing an application of a modification or repair for approval.**

## 2.0 REFERENCE

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- 2.1 Regulation 5.7.1.1., 8.3.1.11, 9.4.1.3 and 9.4.1.11 of the Nigeria Civil Aviation Regulations.
- 2.2 Checklist CL:O-AWS014
- 2.3 FORMS:AC-AWS014; AC-AWS014A

## 3.0 GUIDANCE AND PROCEDURES

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### 3.1 General Information

- 3.1.1 Modification or repairs to an aircraft are normally accomplished in accordance with design data approved by the State of Design and accepted by the Authority.
- 3.1.2 Major modifications and repairs design are prepared only by persons duly authorised with knowledge of the design principles embodied in the aircraft type being modified or repaired.
- 3.1.3 It is required that the analysis and test reports from the original type certification of the aeronautical product are provided for verification that the modification or repair is compatible with all other design changes installed on that aircraft.
- 3.1.4 The effects of any potential incompatibilities between the proposed design change and any known existing or reasonably foreseeable modifications or repairs information to correct airworthiness deficiencies discovered in service which relate to the design change should be documented and submitted to facilitate the approval analysis.
- 3.1.5 There should be a provision to notify the Authority immediately when during the course of incorporation or operation an unsafe condition related to the design change is found.

- 3.2 Application for Approval of Major Modifications and Repairs the application for major modification and/or repair is made by submitting in duplicate a dully completed original Authority's prescribed application Form: AC-AWS 014 for approval of major modifications and/or repairs.



### 3.3 Acceptance of the Application

3.3.1 Ensure application has been made using the prescribed application form submitted in duplicate.

3.3.1 The following modification or repair documents should be attached -

- a) Determination of the classification of the proposed modification or repair (See 3.6)
- b) Detailed description of the proposed modification or repair;
- c) A master documentation list detailing the individual drawings and specifications which define the modification or repair;
- d) Drawings and instructions necessary for incorporation of the modification or repair;
- e) Testing procedures or methods to meet certification and operating rules, such as flammability, carbon monoxide, and noise requirements
- f) Test procedures that are appropriate to the modification or repair and to verify that the modification or repair meets applicable certification requirements.
- g) Detailed design standards, to ensure that the operator has considered all applicable design requirements and acceptance engineering reports including expected test results to be used in determining the compliance of the modified or repaired product.
- h) A record of the change in mass and moment arm when the modification or repair is installed in the aeronautical product;
- i) A record of the change in electrical load when the modification or repair is installed in an aircraft;
  - i) Supplements to:
    - ⓪ The approved flight manual
    - ⓫ Maintenance instructions;
    - ⓬ Instructions for continuing airworthiness
    - ⓭ Repair instructions.
  - j) Any other factors that may affect safety or airworthiness;
  - k) statement of any additional modifications incorporated for the purpose of compliance with the applicable emissions certification requirements;

### 3.4 Application and Documents Evaluation

3.4.1 The major modification or repair documents (as with minor modification or repair



documents) submitted must be in accordance with the aircraft design data approved by the State of Design.

**Note:** *Repairs designed in accordance with the manufacturers Structural Repair Manual (SRM) approved by the airworthiness authority of the State of Design may be accepted because such manuals are considered to be in accordance with approved type certificate data.*

3.4.2 The assigned inspector will Evaluate Application to ensure that:

- a) They verify that classification of the proposed modification or repair is correct based on the logic provided.
- b) The description of the proposed modification or repair correctly and accurately describes the modification or repair.
- c) Documents are complete and if not advice applicant what additional information is needed.
- d) The applicant has conducted and submitted an acceptable conformity evaluation statement that ensures the proposed modification or repair will not impact the airworthiness of the aircraft.
- e) There is proof that the modification or repair is compatible with previously approved modification or repairs.

3.4.3 Study the application document and verify that: -

- a) The proposed modification or repair has no unsafe features;
- b) The applicant has met the requirements for the provision of engineering data and documentation from the State of Design; and
- c) The applicant is authorized or has stated a competent AMO to perform the modification or repair.

### **3.5 Approval**

3.5.1 Approval will only be for major modifications and repairs that have been judged as such based on the logic in para 3.6, and justification for which has been submitted by the operator. In the event the operator has adjudged a modification or repair as minor, and after evaluation the inspector considers it as major, such modification or repair will go through the approval process.

3.5.2 Approval of embodiment of major modifications and repairs is signified by signing the approval section of the application forms. One copy is returned to the applicant



the other is retained by the Authority for records.

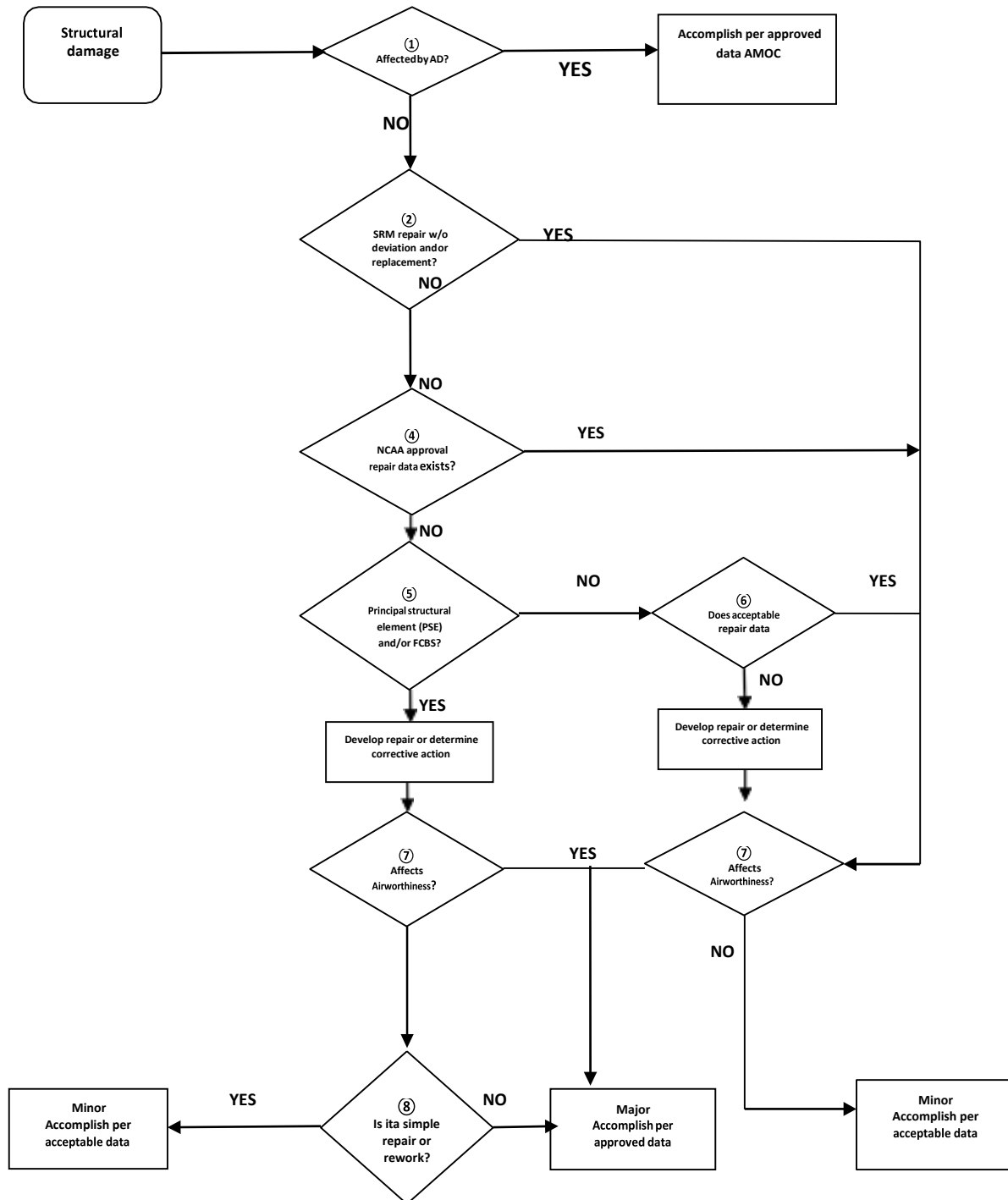
- 3.5.3 If the modification or repair documentation as required has not been submitted, the approval process is stopped and the person responsible for safety oversight is informed and the applicant is notified in writing the reasons for suspension or denial.
- 3.5.4 The applicant can be given opportunity to make corrections as necessary and re-submit the application.
- 3.5.5 The modification and repair will follow the approval process specified in section 4.0

### **3.6 Classification of Modification/Repairs**

- 3.6.1 The following is provided to assist inspectors in verifying proper classification of repairs to airframe structure.
- 3.6.2 The term “repair” in this case includes a reinforcing repair, rework without strength restoration, or unrepaired damage (continue in service condition)
- 3.6.3 Classification of a repair as either major or minor is based on the effect that the repair will have on the aircraft provided the repair is properly installed. It is the operator’s responsibility to ensure that the repair is properly installed regardless of classification.
- 3.6.4 The logic diagram shown below provides understanding of what constitute a major versus minor modification or repair for airframe structure and aircraft systems.
- 3.6.5 Methods, Techniques and Practices are step-by-step, “how-to” instructions for accomplishing maintenance, preventive maintenance, and alterations/modifications. These instructions are considered as acceptable to the Authority if the operator shows that the instructions will return the aircraft, engine, or other article to its original or properly altered condition.
- 3.6.6 NOTE: Standard SRM repairs with or without minor changes is not a basis for classifying repairs as either minor or major. However, the SRM, if approved by the state of design, can be used to support the application of a repair if applicable.



### MAJOR/MINOR REPAIR LOGIC DIAGRAM



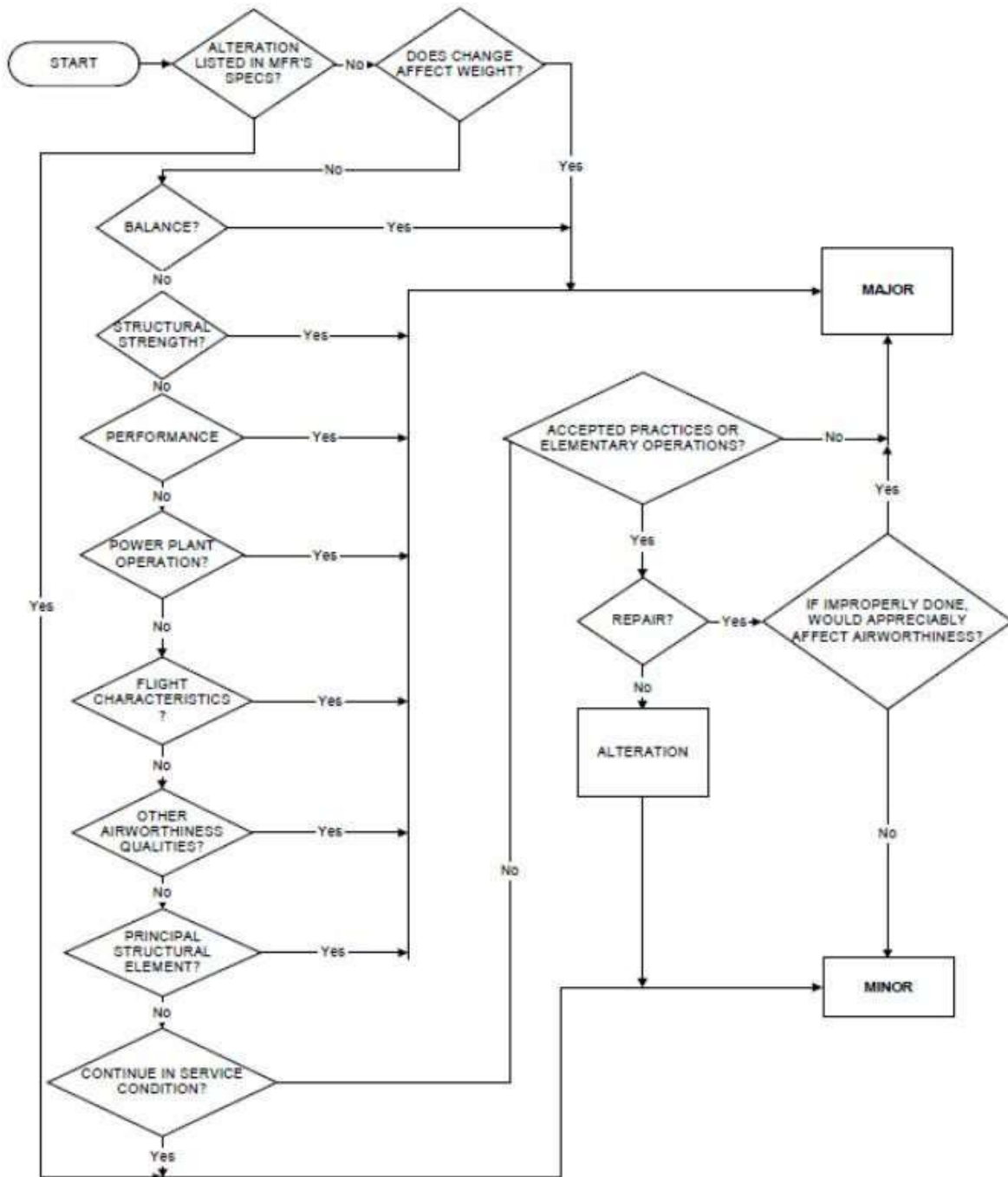
The following notes correspond to the circle notes on the logic diagram:

1. If the damage or repair, no matter how minor, affects compliance to an Airworthiness Directive (AD), then NCAA approval is required.
2. Repair per SRM or replace damaged part with the drawing specified or an approved equivalent part.



4. Existing State of Design approved data may include:
  - Approved Service Bulletin Repair
  - Design Organization approved repair instructions applicable to subject airplane.
  - Repair previously approved
5. Aircraft SRM for each model type may have a listing of Principal Structural Elements (PSE) and Fatigue Critical Baseline Structure (FCBS).
6. Acceptable repair data may include:
  - AOL - All Operator Letter
  - AML - Airplane Modification Letter
  - SL - Service Letter
  - AMM - Aircraft Maintenance Manual
  - CMM - Component Maintenance Manual
  - OHMM - Overhaul Maintenance Manual
  - SOPM - Standard Overhaul Practices Manual
  - Previous Original Equipment Manufacturer (OEM) communication (with structurally acceptable/satisfactory statement or Repair and Deviation Record (RDR)).
7. The repair (as installed) has a significant effect on:
  - Systems Performance – Structural repairs to any element of a system or adjacent to a system should be assessed for possible effects on the intended operation of the complete system.
  - Structural Performance – Repairs to any elements of the structure should be assessed for their effect upon the structural performance of the airframe. Structural performance includes static strength, fatigue, damage tolerance, flutter and stiffness characteristics.
  - Weight and Balance – The effects to be considered are related to overall aircraft CG and aircraft load distribution. Some control surfaces are particularly sensitive to changes that may affect stiffness, mass distribution and surface profile.
  - Aircraft Performance – Repairs that may affect stall characteristics, handling characteristics, or performance lift/drag.
8. Simple repair/rework: blend out, oversizing, replacement, allowable damage extension, partial depth scarfing for composite repairs  
Documentation required:
  - OEM confirmation that condition is structurally acceptable or within certification limits, or;
  - Analysis that shows the condition meets certification limits and is in compliance with Certification Standards.

Note: For non-reinforcing repairs to Fatigue Critical Structure (FCS), operators may submit a request to the aircraft manufacturer who will in turn evaluate and determine if it is acceptable base



**MAJOR/ MINOR MODIFICATION LOGIC DIAGRAM**





## 4.0 MODIFICATION/REPAIR APPROVAL PROCESS

Application for approval of modification or repair design

4.1.1 Any person or organization may apply for approval of a repair design to an aircraft. This could include the aircraft owner or air operator of an aircraft, a type certificate holder, a maintenance, repair and overhaul facility, a specialized engineering organization, an engineering consultant. The approval will be granted to the organization or individual that has responsibility for the repair design. Nig. CARs states that a Contracting State issuing an approval for the design of a modification, of a repair or of a replacement part does so based on satisfactory evidence that the aircraft is in compliance with the airworthiness requirements used for the issuance of the type certificate, its amendments or later requirements when determined by the State. Nig. CARs, further provides that all modifications and repairs comply with airworthiness requirements acceptable to the State of Registry. The NCAA needs to ensure that the applicant has:

- a) comprehensive knowledge, experience, and capabilities in the applicable technologies, such that in- depth analyses can be performed where required.
- b) information on prior repairs in the area where approval is sought.
- c) sufficient information on the type design of the aircraft involved.
- d) If necessary, it is recommended that the State having jurisdiction over the individual or organization responsible for the design of the repair be consulted.

### 4.2 Data Evaluation.

4.2.1 Considerations. This paragraph addresses several general factors that must be considered when evaluating a data package for major repairs and alterations. The following is a summary of considerations:

- 1) Determine the certification basis of product repaired/altered.
- 2) Does the data meet the applicable airworthiness requirements?
- 3) Does the installation meet the requirements of the applicable rules?
- 4) Are there any model-specific issues that would affect accomplishment of the proposed major repair or alteration (e.g., an AD or a limitation contained in the TCDS that requires State of Design consultation for alteration of specific systems)?
- 5) Do the installation instructions provide adequate detail to complete the installation on the aircraft?
- 6) Is the intended function described and appropriate for the aircraft? If based on previously approved data, is the intended function the same as was approved by the original data?
- 7) Are the current or proposed instructions for continued airworthiness (ICA) or maintenance instructions adequate for the proposed repair or alteration? (See Chapter 5, Maintenance Information and Instructions for Continued Airworthiness.)
- 8) Is the equipment being installed required under Nig. CARs Part 7?
- 9) Is the equipment approved per Nig. CARs Part 5?

Note: Any installed equipment must still meet the airworthiness requirements of the product on which it is installed.

- 10) Has adequate substantiating data been provided?
- 11) Is an Aircraft Flight Manual Supplement (AFMS)/Rotorcraft Flight Manual Supplement



(RFMS) required? If so, is it provided?

- 12) Will a flight evaluation be performed? Has it been addressed in the documentation?
- 13) Have applicable, specific considerations been addressed?
- 14) Does the installation or repair affect any special conditions or equivalent level of safety (ELOS) findings? Are those conditions and findings addressed within the supporting data?

Note: This list is not all-inclusive.

4.2.2 Aircraft Airworthiness. The applicant must have conducted an evaluation in order to ensure that a proposed repair or alteration will not impact the airworthiness of the aircraft. The applicant will provide verification that the aircraft has been inspected and any aircraft records have been reviewed in order to ensure compatibility of this repair or alteration with previously approved changes to the aircraft.

4.2.3 Effect. The technical data that a major repair or alteration may require must be determined based on the specifics of each application. Installation of equipment or a system that does not have a primary function in flight operation, and whose failure would have no adverse effect on the ability of the flightcrew to properly perform their duties and does not involve complex interface, still requires sufficient data to show compliance with the certification basis and all applicable requirements. In contrast, an alteration that, if it failed, would have more serious consequences would require more extensive substantiation and supporting technical data.

4.2.4 Compliance with Airworthiness Standards. The repair or alteration data must show compliance with the pertinent certification basis for the aircraft in question. This will include the basic airworthiness standards and, in addition, any special conditions or ELOS findings that may be applicable, including previously accomplished STCs or major alterations.

(e) Operational and Equipment Requirements. An alteration's effect on required equipment and the aircraft's operational capability must be considered in the evaluation of the data package. It is important to ensure that an alteration does not inadvertently reduce the operational capability of the aircraft.

#### 4.2.5 Data

(a) Introduction. This chapter provides guidance related to the sources, use, and approval of data used to substantiate an aircraft major repair or major alteration.

(b) Types of Technical Data. In the context of this order, technical data means the drawings, specifications, and other material that provide the description and substantiation of an aircraft repair or alteration. There are several ways in which data may be labeled and described.

(c) Descriptive Data. Descriptive data describes the design of the repair or alteration. Descriptive data should include reference to installation methods, materials, fabrication processes, dimensions, and tolerances. It may also include intended function and how the alteration is appropriate to the aircraft.

Substantiating Data. Substantiating data shows that the design complies with the applicable regulations and that all appropriate technical considerations have been addressed.

(d) Acceptable Data. Acceptable data means data acceptable to the NCAA. The terms "acceptable to the Authority" and "acceptable to the NCAA" appear numerous times in the



maintenance regulations. They refer to any item addressed in the regulation (e.g., data; methods, techniques, and practices; manual contents; tools; materials; equipment, etc.) that must meet regulatory standards. If the regulation requires only that an item must be “acceptable to,” it does not necessarily follow that the NCAA requires the item to have specific NCAA review and acceptance before it may be used. A person making a determination of whether an item is “acceptable to” the agency must ensure the item addresses specific applicable section(s) of the regulations.

(e) **Approved Data.** Approved data means data approved by the NCAA. The term “approved” is based on Nig. CARs Part 1, which states, “Approved, unless used with reference to another person, means approved by the NCAA or any person to whom the NCAA has delegated its authority in the matter concerned, or approved under the provisions of a bilateral agreement between the United States and a foreign country or jurisdiction.” For the NCAA ASI, “approved” or “approved by” means the item (e.g., data; methods, techniques, and practices; manual contents; tools; materials; equipment, etc.) is required to be and has been reviewed and formally approved by the NCAA (or appropriate Civil Aviation Authority (CAA)). Approvals are granted only by letter, by a stamp of approval, by the issuance of operations specifications (OpSpecs), or by other official means. All data used to substantiate a major repair or alteration, regardless of the source, must be approved before being used.

(f) **Previously Approved.** This term refers to data that was approved for a specific purpose, such as an STC or major alteration on an aircraft, powerplant, propeller, or appliance. All previously approved data has to be applicable to the requested major repair or alteration. All differences, deviations, inclusions, and exclusions between the original use of the data and the current one must be considered before the data can be approved for use. Figure 4-1, Possible Resources for Approved Data Relevant to Major Repairs or Major Alterations, identifies possible sources of previously approved data that may be relevant to a major repair or major alteration. Figure 4-1 is not all-inclusive.

Previously approved data may not be directly applicable to repair or alteration of certain products or appliances. For example, such data may identify a location to which an appliance or component part cannot be located due to a mounting conflict or configuration differences. Relocation may be considered a deviation from the previously approved data. In these instances, the ASI must consider the deviation and, if appropriate, may consult with the cognizant State of Design responsible for issuance of the TC or STC. Consideration for field approval may occur provided that the applicant can show that the alteration meets the certificated characteristics with regard to aerodynamic function, structural strength, resistance to vibration, and deterioration, and that other qualities affecting airworthiness are not adversely affected. Minor deviations from previously approved data do not require reapproval. The aircraft records must identify and include such deviations.



Figure 4-1. Possible Resources for Approved Data Relevant to Major Repairs or Major Alterations

TCDS. Accepted by NCAA, Applicability and Enforcement of Manufacturer's Data, for guidance.
Repair data from FAA AC 43.13-1, Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair, may also be used as approved data, and the AC chapter, page, and paragraph listed in block 8 of FAA Form 337 when the user has determined that it is: Appropriate to the product that receives repairs; Directly applicable to the repair being made; and Not contrary to the airframe, engine, propeller, or appliance manufacturer's repair data or instructions.
Alteration data from FAA AC 43.13-2, Acceptable Methods, Techniques, and Practices—Aircraft Alterations, may be used as approved data for major alterations when the AC chapter, page, and paragraph are listed in block 8 of FAA Form 337 when the user has determined that it is: Appropriate to the product being altered; Directly applicable to the alteration being made; and Not contrary to the airframe, engine, propeller, product, or appliance manufacturer's data.
Airworthiness Directives.
Appliance manufacturer's manuals or instructions, unless specifically not approved by the FAA/EASA, may be used as approved data for major repairs.
Data describing an article used in an alteration which is EASA/FAA-approved under a Parts Manufacturer Approval (PMA).
Data developed during the EASA/FAA authorization of an article for production under a Technical Standard Order (TSO) when applicable to the repair or alteration intended.
Data in the form of an appliance type approval issued by the EASA/FAA/Minister of Transport Canada for those parts or appliances for which there is no current TSO available. The installation manual provided with the appliance includes the environmental performance
FAA DER-approved data, including repair specifications, within the limitations listed on the DER's authorization
FAA ODA-approved data, within the limitations of the ODA holder's procedures manual
State of Design approved portions of Structural Repair Manuals (SRM).
State of Design-approved Service Bulletins (SB) and Service Letters (SL) or similar documents as documented, Use of Manufacturers' Maintenance Manuals.
Original aircraft manufacturer's service and repair data in accordance with current regulations, for major repairs on nonpressurized elements of aircraft that are 12,500 pounds or less determines that: s maximum certificated takeoff weight provided the person intending to perform such repair Data is appropriate for the specific M/M aircraft being repaired; Data is applicable to the specific M/M aircraft being repaired; and The repair does not deviate from the manufacturer's methods, techniques, and practices.

Figure 4-1. Possible Resources for Approved Data Relevant to Major Repairs or Major Alterations (Continued)



STC data, including that for approved model list (AML) STCs, may be used, if applicable, to substantiate a major alteration on a different aircraft.

FAA Form 337, previously approved for use on multiple identical aircraft when used by the original alterer or similarly from the State of Design

Note: Maintenance manuals issued by DAHs, Production Approval Holders (PAH), and certain supplier manuals (i.e., those for which the supplier is the actual designer and producer of an article that is approved State of Design) were developed using part 21 approved technical data. This technical data remains State of Design-approved provided the design change requirements of part 21 are followed. Therefore, it does not require reapproval when a major repair or major alteration is performed in accordance with these maintenance manuals.

4.2.6 The NCAA has established, within its regulations, the requirements for application for approval of repair design. An application for the approval of a repair design should be submitted in a form and manner prescribed, or agreed to, by the NCAA. Information to be submitted on the proposed repair should include, at a minimum, the following:

- the name and address of the applicant.
- the make and model of the affected aeronautical product (registration and/or serial number) and its type certificate number (or approval reference).
- the title, detailed description, and purpose of the repair design.
  - a) the proposed airworthiness standards to which the proposed repair is intended to show compliance, including the identification of any impact on approved airworthiness limitations contained in the ICA for the affected aeronautical product.
  - b) documentation and/or substantiating data of the repair design; and
  - c) when required by a State of Registry for a foreign applicant, evidence of prior approval by the State that has jurisdiction over the individual or organization responsible for the repair design.

### 4.3 Approval activities

The main objective of the approval process is for the NCAA to determine compliance of a proposed repair design with its applicable airworthiness requirements, such that the affected aeronautical product is restored to its approved type design. There are four key activities in the approval of a repair embodiment, namely:

- a) establishing an approval basis.
- b) establishing the means or methods of compliance.
- c) demonstrating compliance and findings.

- d) approving the repair embodiment

### 4.3.1 Establishing an approval basis

4.3.1.1 Nig. CARs states that a Contracting State issuing an approval for the design of a modification, of a repair or of a replacement part should do so on the basis of satisfactory evidence that the aircraft is in compliance with the airworthiness requirements used for the issuance of the type certificate, its amendments or later requirements when determined by the State. The following is the basic policy for modifications/repairs, unless established otherwise by the NCAA:

- For an aircraft, the approval basis is the aircraft design standards recorded in the type certificate data sheet accepted and/or validated by the State of Registry.
- For an engine or propeller, the approval basis is the engine or propeller design standards recorded in the type certificate data sheet accepted and/or validated by the State of Registry.

4.3.1.2 The approval basis for a modification/repair design should not include any proposal for an exemption or a finding of equivalent level of safety because a repair is a restoration to an approved type design. The intent of the repair is to maintain the same level of safety that the aeronautical product was certified to.

4.3.1.3 The approval basis could also be affected by additional requirements that are not related to the original approval or type certification of the aeronautical product. For example, a supplemental SIP or a repair assessment programme for ageing aircraft may influence repair designs to be held to higher design standards or evaluation techniques. In establishing the approval basis, the State of Registry should also account for other factors, such as maintenance or operating rules, which may affect the actual installation of the repair.

### 4.3.2 Establishing the means of compliance

4.3.2.1 The means of compliance is usually dictated by the design standard(s) in the approval basis for which compliance will be demonstrated, and generally falls into one or any combination of the following:

4.3.2.2 Test- is performed when the requirement explicitly calls for a demonstration by test (physical, actual or simulation). Examples of test are fatigue test, simulation, functional or operational test, fire or flammability test, and environmental test (e.g. salt spray).

4.3.2.3 Analysis- is performed when the requirement explicitly calls for a demonstration by analysis (qualitative, quantitative, or comparative). Examples of analysis are failure modes and effects analysis, static strength or damage tolerance analysis, and structural loads analysis.



4.3.2.4 Inspection or evaluation - is performed against an item that does not require test or analysis, but relies on observation, judgment, verification, evaluation, or a statement of attestation from the applicant or its vendors/contractors.

4.3.2.5 By derivation or similarity - is performed when a new repair design can be developed or derived from a previously approved repair and the two repair designs can be considered similar.

### 4.3.3 **Demonstration of compliance**

4.3.3.1 The demonstration of compliance requires that the applicant submit substantiating data (design data, reports, analysis, drawings, processes, material specifications and ICA). The data should be complete and in a logical format for review by the NCAA. Where the demonstration of compliance involves a test, a test plan should be developed and approved prior to any actual test being performed. Official certification tests should be witnessed by DAWS personnel or by a DAWS delegate, when authorized.

4.3.3.2.1 The applicant should give the DAWS access to the aeronautical product being repaired in order to make any inspections, test, and engineering assessment that may be necessary to determine compliance with the approval basis of the repair. However, the applicant should perform its own inspection and test necessary to demonstrate compliance, prior to presenting the repaired aeronautical product to the DAWS for testing or evaluation.

### 4.3.4 **Finding of compliance**

4.3.4.1 The NCAA makes a finding of compliance with the approval basis. The finding of compliance can be made by the DAWS, or by its authorized delegate, depending on the predefined levels of involvement in the repair approval process. Following a successful demonstration of compliance by the applicant, the DAWS, or authorized delegate should make a finding of compliance and conclude the approval process. The findings are usually accomplished through one or any combination of the following actions:

4.3.4.2 Acceptance of substantiating data - Reports, analysis, drawings, or similar documents are usually produced against each item in the approval basis and should be reviewed and accepted. Specific attention should be paid to the methodology and assumptions, rather than the detailed calculations or analysis.

4.3.4.3 Witnessing of test - Tests are performed in accordance with an approved test plan and witnessed by the DAWS or authorized delegate. The test should be conducted only after conformity with the test plan has been established for the test articles, test environment and test facilities. The DAWS or authorized delegate does not perform the actual test

and should remain impartial and concentrated on the test objective.

4.3.4.4 Engineering inspection - Any aspect of the repair design for which compliance with the approval basis cannot be determined through review of drawings or reports, should receive an engineering compliance inspection. An engineering compliance inspection is to assure that an installation, and its relationship to other installations on an aeronautical product, complies with the airworthiness requirements.

4.3.4.5 Conformity inspection -Where required, conformity inspection should be performed by the DAWS, or authorized delegate to verify conformity of the repaired aeronautical product with drawings, specifications and special processes. An engineering inspection should not be confused with a conformity inspection. A conformity inspection is done to determine conformity to the engineering data, while an engineering inspection is done to determine compliance with the approval requirement.

#### **4.3.5 Approving the modification/repair embodiment**

4.3.5.1 The NCAA approval of the repair embodiment should be documented, and a physical record retained by the air operator, as required by the maintenance record-keeping requirement of Nig. CARs A statement of "no technical objection" should be avoided; such an expression does not mean an approval, acceptance, or rejection. The NCAA Inspector should consider documenting a clear approval through one of the following means:

- a) issuance of an approval letter signed by the NCAA.
- b) issuance of an approval using a standard form established by the NCAA.
- c) by signature or marking (stamp or seal) the repair approval document as submitted by the applicant; or
- d) in the case of recognizing foreign approvals, a statement of endorsement that such foreign approval is considered approved by the State of Registry.

4.3.5.2 The modification/repair embodiment should not be approved if there is a known or suspected design feature that could make the repaired aeronautical product unsafe after installation. An example would be the use of an inappropriate type of blind fasteners (multi-piece) to install a structural repair patch in an area subject to repeated vibration.

4.3.5.3 The NCAA Inspector should stipulate limitations, if any, associated with its approval of the repair design. The limitations should include time limits (in the case of temporary repairs, or life-limited repairs), follow-up or repeat inspection requirement, installation considerations, specific applicability (or repeatability of application) to aeronautical product(s), permitted deviations or substitutions from the repair design. The limitations should also identify approved changes or revisions to the approved





airworthiness limitations contained in the ICA for the affected aeronautical product.

#### **4.4 Post-approval activities**

4.4.1 The activities following approval of a repair design involve accomplishing the repair on the aeronautical product, documenting the repair accomplished, and issuing the maintenance release of the affected aeronautical product. Where necessary, the relevant maintenance manuals should also be updated.

4.4.2 The NCAA Inspector should keep a record of approvals granted for repair embodiment. This should include the supporting documents submitted with the application. Responsibility of holder of modification approval

4.4.3 The holder of the modification approval remains responsible for the continued integrity of the design change to approved type design and it or its representative must continue to be the NCAA's contact point for resolving issues that may require corrective action. To fulfill this responsibility, the holder should have the continued capability, or access to a capability, of providing appropriate technical solutions for service difficulties when service experience warrants it, or when the NCAA requires mandatory corrective action. If the holder is no longer capable, the NCAA must act in accordance with Chapter 9 of this Part. If the approval is transferred to another holder, the NCAA Inspector should determine that the new holder can fulfill the minimum responsibilities described herein.

#### **4.5 Maintenance Information and Instructions for Continued Airworthiness Repair or Alteration Data Package.**

4.5.1 Continued Airworthiness. The NCAA has determined that the major repair or major alteration data package must address how the major repair or alteration affects continued airworthiness. If the major repair or alteration does not affect continued airworthiness, then the applicant must state such. If the major repair or alteration affects the ICA, then the applicant must develop maintenance information which addresses those changes. If the major repair or alteration affects the Airworthiness Limitation Section (ALS) of the ICA, then that maintenance information that affects the ALS must be approved by the State of Design.

4.5.2 Maintenance Information. The purpose of maintenance information is to provide adequate instructions to maintain the altered product in an Airworthy condition. Maintenance Information Checklist. The maintenance information checklist (see Figure 4-2, Major Repair or Major Alteration Maintenance Information Checklist) is a guide for the applicant who develops maintenance information in accordance with methods, techniques, and practices acceptable to the NCAA.

4.5.3 Advantages of Maintenance Information Checklist. The maintenance information provides the aircraft owner or operator with the following advantages when it is included in block 8 of NCAA Form AC-AWS014:

The major alteration and reference to the maintenance information are contained in one document;



The maintenance information becomes a permanent aircraft record, as required by Nig.CARs and the owner or operator can contact the FAA registry for a replacement NCAA Form AC-WS014 if the maintenance information is lost or destroyed. The owner or operator may also forward a previously completed NCAA Form AC-AWS014 and the associated maintenance information if it is not currently in the registry.

4.5.4 Future Inspections. The additional reference to the presence of maintenance information as part of the major alteration in the aircraft’s maintenance entry will ensure that maintenance personnel appropriately address maintenance of the major repair or alteration during future inspections.

Figure 4-2. Major Repair or Major Alteration Maintenance Information Checklist

A/C Make_____		Model_____	S/N_____	Reg. #N_____
Revision:_____		Date:_____	System:_____	
Item	Subject			
1.	Introduction: This section briefly describes the aircraft, engine, propeller, or component that has been altered. Include any other information on the content, scope, purpose, arrangement, applicability, definitions, abbreviations, precautions, units of measurement, referenced publications, and distribution of the maintenance information,			
2.	Description: Describe the major alteration and its functions, including an explanation of its interface with other systems, if any.			
3.	Control, operation information, or special procedures, if any.			
4.	Servicing information: Such as types of fluids used, servicing points, and location of access panels, as appropriate.			
5.	Maintenance instructions: Such as recommended inspection/maintenance periods in which each of the major alteration components are inspected, cleaned, lubricated, adjusted, and tested, including applicable wear tolerances and work recommended at each scheduled maintenance period. This section can refer to the manufacturer’s instructions for the equipment installed where appropriate (e.g., functional checks, repairs, and inspections). It should also include any special notes, cautions, or			
6.	Troubleshooting information: Information describing probable malfunctions, how to recognize those malfunctions, and the remedial actions to be taken.			
7.	Removal and replacement information: This section describes the order and method of removing and replacing products, parts, and any necessary precautions. This section should also describe or refer to manufacturer’s instructions to make required tests, trim checks, alignment, calibrations, center of gravity (CG) changes, lifting, or shoring, etc.,			
8.	Diagrams: Of access plates and information, if needed, to gain access for inspection.			
9.	Special inspection requirements: Such as x-ray, ultrasonic testing, or magnetic particle inspection, if required.			
10.	Application of protective treatments: To the affected area after inspection and/or maintenance, if any.			



A/C Make_____		Model_____		S/N_____		Reg. #N_____	
11.	Data: Relative to structural fasteners such as type, torque, and installation						
12.	List of special tools: Special tools that are required, if any.						
13.	For commuter category aircraft: The following additional information must be furnished, as applicable: A. Electrical loads. B. Methods of balancing flight controls. C. Identification of primary and secondary structures. D. Special repair methods applicable to the aircraft.						
14.	Recommended overhaul periods: Are required to be noted on the maintenance information when an overhaul period has been set by the manufacturer of a component or equipment. If there is no overhaul period, the maintenance information for item 14 should state, "No additional overhaul time limitations."						
15.	ALS: Include any approved airworthiness limitations (AL) identified by the manufacturer or FAA Certificate Management Aircraft Certification Office (CMACO) (e.g., an STC incorporated in a larger field-approved major alteration may have an AL). The FAA inspector will not establish, alter, or cancel ALs without coordinating with the appropriate FAA CMACO. If there are no changes to the ALs, the maintenance information for item 15 should state, "No additional airworthiness limitations" or "Not applicable."						
16.	Maintenance information is required to be acceptable to the FAA. As such, changes should be documented by submitting the revised maintenance information along with the original FAA Form 337 to the Aircraft Registration Branch in Oklahoma City. An entry in the aircraft records should indicate the current revision.						

4.5.5 Maintenance Instruction Requirements. The maintenance instruction requirements for a major alteration are very similar to those for an STC except that an applicant for an STC must produce ICA. Changes that affect the ALS must be approved by the cognizant ACO or a qualified ODA. Changes that affect the certificated life limit of a part are major changes to type design and must not be field-approved. The vast majority of major alterations approved by the field approval process are simplistic in design and execution. Therefore, the applicant's maintenance information may not need as much detail as it would for a complicated STC. If the manufacturers' instructions are not available, the applicant may use State of Design/State of Registry recommendations

4.5.6 Changes to Maintenance Information After Approval. If owners or operators wish to formally incorporate maintenance information developed for existing major alterations, they may do so using the revision process in checklist item number 16 in Figure 4-2. Maintenance Information Procedures.

4.5.7 Description of Maintenance Information. Each major alteration that requires additional maintenance or inspections not covered by acceptable OEM's instructions must have maintenance information prepared in accordance with methods, techniques, and practices acceptable to the State of Design. The description of the maintenance information prepared will be documented on NCAA Form AC-AWS014. The ASI, will advise the applicant that the entry for the major alteration in the aircraft's maintenance records required by Nig. CARs must also include a reference to the maintenance information and be identified by the approval date of the NCAA Form AC-AWS014 on which the instructions are documented. The form will be kept



in the aircraft's permanent records, in accordance with Nig. CARs.

4.5.8 Supporting Data. If the applicant employs a EASA Part 21 DOA /FAA DER or ODA to provide approved technical data to support a major repair or major alteration, then the applicant is responsible for ensuring that the EASA Part 21 DOA /FAA DER or ODA is authorized to approve such technical data, as applicable to the repair or alteration. If the data, as approved, addresses the entire repair or alteration, and all of the requirements of Nig. CARs are met, there is no requirement for any further approval by the ASI. If the repair or alteration data is approved solely by the EASA Part 21 DOA /FAA DER or ODA, but necessitates maintenance instructions, the maintenance instructions should be prepared by the applicant and recorded in block 8 of NCAA Form AC-AWS014.

#### 4.6 Continued Airworthiness.

4.6.1 The maintenance information must include specific instructions that describe how to maintain the affected area in order to ensure continued airworthiness. For example, the maintenance information might include a new requirement for a special inspection to be accomplished during each 100-hour or annual inspection. Such maintenance information must also include installed appliances that may impact maintainability of the product or require periodic maintenance to ensure their continued performance. When appropriate, the maintenance information should also include specific instructions for determining excessive wear or deterioration, troubleshooting information, installation and removal procedures, and functional checks. Servicing requirements, such as recommended fluid change intervals or lubrication schedules, should also be included.

For EASA Part 21 DOA /FAA DER or ODA -approved data, the applicant is responsible for preparing maintenance information acceptable to the State of Design and State of Registry, and when done in accordance with Figure 5-1, is considered acceptable to the NCAA.

4.6.2 Maintenance Information Approval. In the instances that a repair or alteration must meet State of Design requirements for support of the continued airworthiness of and safety improvements for transport category airplanes, only the ACO may approve the maintenance information developed. The maintenance information must contain:

- a) Inspection tasks and task intervals;
- b) Instructions and procedures to accomplish the tasks, which are contained in the Aircraft Maintenance Manual (AMM); and
- c) Protection and caution instructions and information, which are contained in the standard wiring practice manual (SWPM).