

# A-304 Aircraft Maintenance



## Participant Workbook



Prepared by Office of Aviation Services Training Division  
and Interagency Aviation Training Partners  
Revised April 23, 2014

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## Version Control

<b>Version</b>	<b>Description</b>	<b>Date</b>
1.00	Original Materials	March 23, 2012
1.50	Formatting Corrections	November 8, 2013
2.0	Content clarified, updated formatting and references	April 23, 2014

## **A-304 Aircraft Maintenance Course Overview**

### **What is authorization for the course?**

OPM-04, IAT Training Guide

### **What is the purpose of the course?**

The purpose of this course is to provide an overview of what aviation managers should look for to ensure that proper aircraft maintenance is being performed.

### **Who are the intended participants?**

Bureau employees in the role of "Helicopter Manager – Resource"

### **What are the pre-requisites for the course?**

None

### **What are the course objectives?**

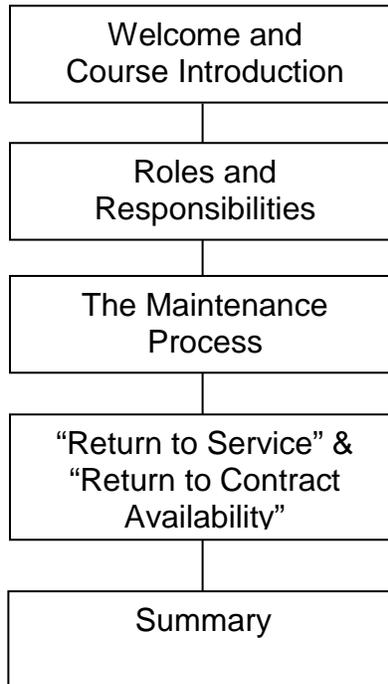
At the conclusion of this course, participants should be able to:

1. Define the role and responsibilities of a Pilot in aircraft maintenance.
2. Define the role and responsibilities a Maintenance Technician.
3. Define the role and responsibilities of an OAS/FS Interagency Inspector.
4. Describe the Aircraft/Helibase Manager's roles and responsibilities in aircraft maintenance.
5. List to the agency policies and documents regarding aircraft maintenance requirements.
6. Define aircraft scheduled maintenance.
7. Define aircraft unscheduled maintenance.
8. Identify the difference between "Return to Service" and "Return to Contract Availability."
9. Describe the process to follow when an aircraft has a maintenance concern.

These will be referenced at the beginning of each module as well.

# A-304 Aircraft Maintenance

## Course Map





## Welcome and Course Introduction

### Get to Know Your Classmates

Be prepared to share:

- Your name?
- Your position?
- How long have you been involved in aviation?

### Course Introduction

Why is Aviation Maintenance important?

- Maintenance includes inspection, servicing and repair
- It ensures that the aircraft is airworthy and most of all safe to operate.
- There are consequences to poor maintenance.
- YOU are important!

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## Module 1: Roles and Responsibilities



### Objectives

1. Define the role of a Pilot with regards to aircraft maintenance.
2. Define the role and responsibilities a Maintenance Technician.
3. Define the role and responsibilities of an OAS/FS Interagency Inspector.
4. Describe the Aircraft/Helibase Manager's role in aircraft maintenance.

### The Role of the Pilot with Regards to Aircraft Maintenance

The owner or pilot of an aircraft is primarily responsible for maintaining the aircraft in an airworthy condition. The pilot performs preflight inspections and annotates any maintenance discrepancies in the aircraft logbook. The procedures for maintaining the logbook are:

- 1) The pilot will make an entry in the logbook to note the maintenance discrepancy.
- 2) A mechanic must clear any discrepancies (make repairs as needed).
- 3) The mechanic will then sign off as completed in the logbook.
- 4) A DOI/USFS aircraft inspector must also be notified and may wish to speak to the pilot or mechanic. They may also review the logbook entries. Some maintenance items require the aircraft to be run up; some require the aircraft to be flown before the discrepancy can be cleared.

- 5) A DOI/USFS aircraft inspector or Helibase Manager will need to give "Return to Availability" approval for the aircraft to return to use.
- 6) A SAFECOM must be completed and may include information or comments from the pilot. This may be done by the Helibase Manager and possibly involve the Pilot.

The pilot is also responsible for ensuring all discrepancies have been properly cleared before returning the aircraft to service (through actual flight).

### **Daily Pre-Flight Checks**

It is the pilot's responsibility to ensure a daily pre-flight check is performed on the aircraft. This check time should be focused and uninterrupted; this is not the time to load the aircraft or plan the mission. On some aircraft these inspections are performed by a mechanic and are entered into the aircraft records.

During pre-flight, the pilot checks for acceptable wear:

FAR 91.7(b) The pilot in command of a Civil Aircraft is responsible for determining whether that aircraft is in a condition for safe flight.

### **Pilot Functioning as Mechanic**

In accordance with 14 CFR 43.3(h), 43.5 and 43.7, pilots may perform preventive maintenance on the aircraft.

Not all contracts are the same when it comes to pilot and mechanic duties. Each contract for the aircraft should be read to determine the roles, responsibilities and expectations for that contracted use. If the contract allows the pilot to function as a mechanic, the pilot must meet all the mechanic qualifications of the contract. This may affect flight and duty hour limitations. Additionally, the pilot must be approved by the contractor's FAR Part 135 operations specifications.

### **The Role of the Maintenance Technician**

- Maintains the aircraft in accordance with the manufacturer's manuals and current technical libraries; also maintains the equipment associated with operational aviation missions
- Makes logbook entries of all corrective actions taken during maintenance
- Provides copies of logbook entries to DOI/USFS Aircraft Inspector and/or Helibase Manager as requested
- Be cognizant of recent and upcoming major component changes Airworthiness Directives (AD) and mandatory service bulletins coming due
- Communicates to Pilot and Helibase Manager any discrepancies, scheduled and unscheduled maintenance activities

- Ensure all maintenance is recorded in the logbook; all entries shall have brief description, date, aircraft total time, certificate number, signature, and next due date if applicable

### **The Role of the DOI/USFS Aircraft Inspector**

- Inspects fixed wing, rotor wing, and associated equipment for compliance with contracts and technical data when requested
- Assists managers/users and CO's with maintenance, operational issues, or questions/concerns that surface while on contract
- Returns aircraft to contract availability after an unscheduled maintenance event
- Inspectors make decisions based on contract requirements and inspector's experience with the equipment

### **The Role of the Aircraft/Helibase Manager**

- Understands responsibilities within the contract and agency/bureau policy
- Facilitates maintenance through awareness and planning
- Reports findings to safety (SAFECOM) and DOI/USFS aircraft inspectors
- Records aircraft use time and availability on pay documents
- When an aircraft is down for maintenance, calls a USFS/DOI aircraft inspector.
- Facilitates communications between pilot, maintenance technician, USFS/DOI aircraft inspectors, and vendor
- Documents all communications in a daily journal
- Halts operations until aircraft inspector gives approval for unscheduled events
- Notifies all parties involved of changes and progress

### **Who Performs Aircraft Maintenance?**

- Airframe and Powerplant Mechanics (A&P)
- Inspection Authorization (IA)
- F.A.A. Approved Repair Stations (usually done by a repairmen under the repair station approved for specific functions)
- Pilot (if not an A&P): Pilots are only allowed to perform what is called "Preventive Maintenance and even then are limited. They must have an approval letter defining what they can do. Ref 14 CFR (FAR) 43.3(h)

**To be an approved mechanic, the mechanic must have/meet:**

1. A&P for at least 24 months, with 18 months of experience directly prior to contract.
2. At least twelve months helicopter experience, three months of which must have been within the last two years.
3. Maintained a helicopter of the same make and model in “field” conditions for at least three months.
4. Either:
  - A) A manufacturer’s maintenance course, or
  - B) An accepted contractor’s training course, or
  - C) At least twelve months of maintenance experience on the same make and model of helicopter.
5. Agency requirements:
  - USFS Contracts: An Interagency Mechanic Qualification Card issued by an Interagency Maintenance Inspector. They shall furnish this at your request, for your inspection.
  - DOI Contracts: DOI inspects mechanics for required qualification, however only issues card when requested in the contract.

**Interaction/Activity:****Scenario:**

A Type 3 Helicopter has a leak in the engine compartment. The pilot grabs his tools and starts checking engine lines for the source of the leak.

**Question:**

What questions would you ask the pilot if he were starting to perform maintenance on the aircraft?

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## Module 2: The Maintenance Process

### Objectives

5. List to the agency policies and documents regarding aircraft maintenance requirements.
6. Define aircraft scheduled maintenance.
7. Define aircraft unscheduled maintenance.

### 14 CFR Part 1 “Maintenance”

- Inspection
- Overhaul
- Repair
- Preservation
- Replacement of Parts

### Aircraft Maintenance is governed primarily by the ordering agency’s policy:

- USFS Manuals and Handbooks (5700)
- DOI Departmental Manual (DM 350-353)
- Other directives FAA and OEM
- Procurement documents (Contracts)

### Secondarily policy documents are referenced in procurement documents. These secondary documents are:

- Federal Aviation Regulations 14 CFR Parts (FARs) 39, 43, 91, 133,135,137, etc.
- Aircraft manufacturers’ recommendations, including flight manuals, maintenance manuals, and service bulletins

### Aircraft Approval Process:

Our approval process ensures the level of safety that is expected.

USFS has oversight of their aviation operations. OAS has oversight for DOI agency aviation operations. The contractor is selected through the procurement process. The procurement document or contract must be awarded to provide inspectors the binding criteria. Aircraft approval or “carding” can be accomplished by any qualified Interagency inspector (USFS or OAS). The aircraft requires a technical conformity inspection **before** it can operate on the contract. The aircraft card will have all the approved missions this aircraft has been inspected for. Managers should call the inspector on the card for detailed questions.

Whether scheduled or unscheduled maintenance, the mechanic must have technical data available to perform maintenance on the aircraft. Ref. 14 CFR 43.13

This means to work on the aircraft, they must have with them the maintenance manuals, parts manuals, Airworthiness Directives (ADs), and Service Bulletins (SBs) pertaining to the work they are doing.

### **Carding Forms:**

- FS Point to Point card
- FS5700-21 Airplane card
- FS5700-21A Helicopter Card
- AMD-47 Point to Point card
- AMD-36A Airplane card
- AMD-36B Helicopter card
- Pilot Qualification Card
- Mechanic Qualification Card
- Fuel Service Truck Data Card

### **Aircraft Maintenance Types**

- Aircraft must be maintained to insure safety and reliability.
- Aircraft maintenance falls into two categories:
  - Scheduled
  - Unscheduled

### **Routine Scheduled Maintenance vs. Unscheduled Maintenance**

- Routine scheduled maintenance is covered under the contract and consists of the aircraft inspection programs usually based on time (flight), calendar (date to replace or inspect) or cycle (starts and/or landings).
- Unscheduled maintenance covers any other than those items covered under scheduled maintenance, i.e. part failures, excessive leaking, component changes, events that require extensive additional maintenance and inspection. The unscheduled maintenance items may need the DOI/USFS aircraft inspectors to be involved to provide "Return to Availability" approval.

Whether scheduled or unscheduled maintenance, the mechanic must have technical data available to perform maintenance on the aircraft. Ref. 14 CFR 43.13

This means to work on the aircraft, they must have with them the maintenance manuals, parts manuals, Airworthiness Directives (ADs) and Service Bulletins (SBs) pertaining to the work they are doing.

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**Interaction/Activity:**

**Scenario:**

A helicopter that had the mission of performing bucket work is now going to be operated at a much higher altitude and hauling people instead.

**Question:**

What things do you need to check as a helicopter manager?  
What are the concerns?

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**Scheduled Maintenance**

- Inspections: 50hr,100hr/Annual, Phase/Progressive inspection programs
- Component overhauls or time changes based on cycles, flight time, or calendar time
- Airworthiness Directives (A.D.s) or Service Bulletins (S.B.s) are all scheduled maintenance items when they are recurring.



**Interaction/Activity:**

**Scenario 1:**

The mechanic of a vendor comes to you with a plan to change out an engine a week from now.

**Question:**

Is this scheduled or unscheduled maintenance?  
Does an inspector need to be contacted, and if so, when?

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**Scenario 2:**

The mechanic of a vendor comes to you with a request to change a tail rotor gearbox right now.

**Question:**

Is this scheduled or unscheduled maintenance?  
Does an inspector need to be contacted, and if so, when?

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## Unscheduled Maintenance

- Items found as a discrepancy during scheduled maintenance
- Any discrepancy that is noticed previous to (Pre-Flight), during or post flight
- Emergency airworthiness directives or bulletins

These items may need approval of a qualified Aircraft Maintenance Inspector before returning the aircraft to contract use.

### Examples of Items to Call a Maintenance Inspector About:

- Repetitive chip lights
- Numerous dense or lines found on main and tail rotor blades
- Component replacements due to premature failure:
  - Tail rotor problems
  - Main rotor problems
  - Gearbox problems
  - Landing gear problems
- Something leaking excessively
- Numerous small partials of foliage found on the helicopter
- Anytime you see or hear something you feel is unusual



#### Interaction/Activity:

##### Scenario:

You approach a helicopter and you find small particles of wood and leaf material on top of the helicopter. Upon further inspection, you find lines horizontal across the tail or main rotor blades.

##### Question:

What would you do?

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**Module 3: “Return to Service” and “Return to Contract Availability”**

[www.IAT.gov](http://www.IAT.gov)

**Objective**

8. Identify the difference between “Return to Service” and “Return to Contract Availability.”
9. Describe the process to follow when an aircraft has a maintenance concern.

**“Return to Service”**

- Approval for “Return to Service” is what an aircraft mechanic does after maintenance has been completed by making their entry in the aircraft maintenance records.
- After any maintenance is accomplished there must be an entry in the aircraft maintenance records. That entry is the approval for return to service. Ref. 14 CFR (FAR) 43.9.

### **“Return to Contract Availability”**

- Whenever an aircraft becomes unavailable for maintenance, before it can be used it again on contract, it must be approved for “Return to Contract Availability.”
- This process is part of the technical inspectors’ oversight to insure the level of safety that is expected. This usually consists of a flow of information from the agency user to the Aircraft Inspector.

### **When to Call an AMI**

The Departmental Manuals and Forest Service Handbook give guidance on when a AMI is needed. There are no specific lists to say in what situation you should or should not call. When in doubt, contacts can be found through the Interagency Aviation Technical Directory at <http://www.fs.fed.us/fire/aviation/>.

### **Whenever a maintenance concern is identified with an aircraft, the following process should be followed:**

- Agency user notifies the Aircraft Inspector depending on the severity of the discrepancy even before the aircraft is repaired. This allows the Aircraft Inspector to do research, if necessary, on the requirements for the repair. They also may need to make arrangements to get to the aircraft, if an onsite inspection is needed.
- Once the aircraft is repaired the Aircraft Inspector may want to talk to the mechanic and will want a copy of the maintenance log entry and the maintenance release form, if a part or component was changed, faxed to them.
- Depending on the repair, a flight test may be needed also.
- **When in doubt, call and ask an inspector.**

### **Flight Operations Handbook**

FSH 5709.16, 17.2 – “Do not return aircraft having mechanical or equipment deficiencies to contract availability until the aircraft has been approved by an authorized aircraft inspector. Depending on the complexity of the mechanical breakdown, an on-site inspection may not be required by an authorized interagency aircraft inspector and approvals may be given by electronic means.”

The AMI may ask for a copy of the release forms.

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## Maintenance Release Forms

- Serves as an approval for “Return to Service” document after maintenance, preventive maintenance and alteration of a part or component
- Can also be used to identify “new” parts and products that are being installed
- Also called:
  - FAA form 8130-3
  - Yellow tag

## Mishaps and SAFECOMs

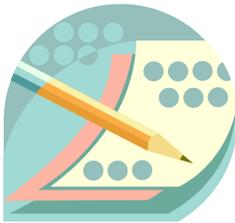
Use the Interagency Aviation Mishap Response Guide and Checklist.  
Use a recorder and gather notes, photos and documents.

Mishaps are incidents with an aircraft that has determined the aircraft should not be used until further investigation.

A SAFECOM should be filed whenever you encounter:

- Any maintenance deficiency
- Any event that is not standard operating procedure

<http://safecom.gov> 1-800-464-7427



### Interaction/Activity:

#### Scenario:

A Type 2 Helicopter returns to base with a transmission chip light. The mechanic pulls the chip plug, finds small fuzz, cleans it, and determined that the aircraft is ready for the next mission.

#### Questions:

Does this event require any action from the manager, i.e. SAFECOM, Mishap reporting, etc.?

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## Summary

### REMEMBER:

- You as the end user are the last line of defense.
- Inspectors see a snapshot, you see the whole picture show.
- Communication is the key!
- Submit SAFECOMs. It's the only tool we have to track internal maintenance trends.
- If any situation feels or looks out of control, it most likely is. Be safe and make the call!

### Objectives Review

You should now be able to:

1. Define the role and responsibilities of a Pilot in aircraft maintenance.
2. Define the role and responsibilities a Maintenance Technician.
3. Define the role and responsibilities of an OAS/FS Interagency Inspector.
4. Describe the Aircraft/Helibase Manager's roles and responsibilities in aircraft maintenance.
5. List the agency policies and documents regarding aircraft maintenance requirements.
6. Define aircraft scheduled maintenance.
7. Define aircraft unscheduled maintenance.
8. Identify the difference between "Return to Service" and "Return to Contract Availability."
9. Describe the process to follow when an aircraft has a maintenance concern.

If you have any additional questions, please ask the instructor at this time. Please complete the course evaluation provided as well.