

APPROVAL AND ACCEPTANCE OF THE AIRCRAFT OPERATING MANUAL (AOM)

GUIDANCE MATERIAL FOR INSPECTORS
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SOUTH AFRICAN



*CIVIL AVIATION
AUTHORITY*

AIR OPERATOR CERTIFICATION

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APPROVAL AND ACCEPTANCE OF THE AIRCRAFT OPERATING MANUAL (AOM)

I. GENERAL

An AOM must contain the required information and be approved by an Inspector in terms of CAR 121.04.3. An approved AOM must be carried aboard an aircraft in terms of CAR 91.03.2. Inspectors must evaluate an operator's AOM using the guidance that follows.

A. Identification as a Flight Manual.

Inspectors must ensure that an AOM is clearly marked as an approved flight manual for a specific operator. Sections of an AOM, which contain approved information, must also be clearly identified.

B. Approved Sections of an AOM.

Inspectors must ensure that the approved sections of an AOM contain all of the information that is required by the flightcrew to operate the aircraft. Inspectors should evaluate the approved sections of an AOM for the following:

1. The procedures section of an AOM must contain all procedures required by the AFM and for each operation the operator conducts. As a minimum, the operator must include sufficient detail to allow a trained crew to safely and effectively operate the aircraft. The Procedures Section of the manual may be divided into subsections such as normal, non-normal, and emergency procedures.

Note: Emergency procedures are referred to as non normal procedures by many aircraft manufacturers.

2. The operator's performance data in an AOM must contain the data from the AFM and instructions on how to use that data. Operators may assign the responsibility for performing takeoff and landing data computations to flightcrew or ground personnel. The flightcrew must have access to adequate data in the cockpit, (including information for the specific airport and runway to be used) to perform the computations for which they are responsible. When takeoff and landing data is presented in tabular format for specific runways, it is often referred to as an airport analysis. Performance data may be published under separate cover and be given titles such as performance manual or airport analysis. When performance data is published under separate cover, it must be identified as a portion of the AOM. Takeoff and landing performance data may be stored in an on board or ground based computer.
3. The Limitations Section of an AOM must be clearly identified as approved. The Limitations Section of an AOM must contain each limitation, which is contained in the AFM.

C. Accepted Sections of an AOM.

Accepted sections of an AOM may contain supplementary information such as aircraft and systems descriptions, an expanded explanation of procedures, special policies and procedures, and other selected topics pertinent to operation of the aircraft type. The accepted sections of a AOM must conform to the regulations and safe operating practices but do not need to conform to corresponding sections of the AFM, either in format or content. Inspectors should ensure that the AOM developed by or for the operator contains sufficient explanation and guidance for flightcrew use in the safe operation of the particular aircraft type. Background information or information that is not specific to the operation of the particular aircraft should be placed in a section of the Operations Manual, rather than in a supplementary section of the AOM.

II. AIRCRAFT SYSTEMS DESCRIPTION.

Operators must provide crewmembers with a systems description of an aircraft's systems and components that contains sufficient detail to allow flight crewmembers to adequately understand and perform all procedures in the flight manual. AFMs, and AOMs may or may not contain a systems description section. The aircraft systems description section of a manual is "accepted" as opposed to "approved." Operators may choose to place the systems description information in an accepted section of an AOM or in a section of the Ops Manual, such as a training manual.

III. PROCEDURES

Inspectors should not construe procedures published in an AFM to be the only or best means of accomplishing a specific objective. Because AFM procedures are formulated primarily for aircraft certification purposes, Inspectors should encourage operators to develop procedures appropriate to revenue operations for inclusion in an AOM.

A. Tailoring the Operator's Procedures

Procedures incorporated in an AOM should be tailored by the operator to accommodate the operator's type of operation, fleet, standardisation objectives, and cockpit management objectives. As an operator's operations become more complex, it is progressively more important to include detailed guidance in the flight manual, which is specifically tailored to the operator's operations.

B. Approving Different Procedures

Aircraft, which have been modified by **Supplemental Type Certificate (STC)**, may require different procedures than unmodified aircraft. Inspectors must coordinate approval of procedures with Airworthiness Inspectors to ensure modifications are accounted for in the operator's procedures.

C. Step-by-Step Format

Procedural information included in a AOM must be presented in a step by step format. A procedural step in an AFM procedure must be included in the equivalent AOM procedure, unless the inspector approves the deletion through the process described in subparagraph I that follows.

D. Standard Operating Procedures

Operators are responsible for developing effective standard operating procedures. The development process for standard operating procedures consists of the operator or other qualified party (such as the manufacturer) conducting a painstaking task analysis of the man machine environment relationship. Although this analysis is time consuming and expensive, it is necessary to meet the required level of safety in air transport operations. Specific guidelines for developing aircraft operating procedures are almost nonexistent. Inspectors should encourage those operators that do not have extensive experience in developing their own procedures to follow the manufacturer's recommendations.

E. Inspector's Responsibility

Inspectors should ensure that operators standardise their operating procedures both within and across aircraft types to the greatest extent possible. Inspectors should make operators aware of the following information concerning procedures for standardisation:

1. Standardised procedures promote understanding and effective communications between crewmembers. Research has shown that standardised procedures and effective communications are significant factors in reducing error in the cockpit and in enhancing safety.
2. Crewmembers of most large operators operate numerous different aircraft during their career. Standardised procedures enhance a crewmembers transfer of learning and minimise negative transfer when the crewmember transitions from one aircraft to another.

3. A complete standardisation of procedures is not possible when there are significant differences between "manufacturer's" and "installed" equipment. A high degree of standardisation, however, is possible. For example, the flight procedures for: engine failure after V1, engine fire after V1, and a missed approach with an engine out, can be designed to be identical. Each procedure might include the aircraft climbing at a reference speed to an identical clean up height, then accelerating, then retracting the flaps, and then continuing the climb at specified engine-out climb speed. The reference speeds might change depending on the aircraft weight, but the procedure could otherwise be identical. If the operator designed these procedures carefully, they could be used on all aircraft in the operator's fleet.
- F. Approving Combined Procedural Steps
- Inspectors may approve combined procedural steps. For example, an AFM or RFM procedure specifies a two-step procedure such as the following: Step 1 - Smoke Goggles On, and Step 2 - O2 Mask On. The inspector could approve a one-step procedure such as the following: Step 1. Smoke Goggles and O2 Mask - On. If there is a specific reason, however, for not combining the steps, the inspector must not approve such combinations. For instance, if in the previous example, for some reason the smoke goggle has to be put in place before the O2 mask can be put into place, the two-step procedure should be retained.
- G. Approving a Different Sequence of Steps
- Inspectors may approve an arrangement of procedural steps in a different sequence from the sequence in the AFM. The operator must demonstrate to the Inspectors satisfaction that the change in sequence is safe and effective through validation testing. The inspector shall ensure adverse effects are not introduced. For example, with many aircraft the flaps are required to be extended or the trim to be set to specific settings before an adequate control check can be accomplished. If this sequence is reversed, the control check is invalid.
- H. Approving the Combination of Procedures into a Single Procedure
- Inspectors may approve the combination of similar procedures into a single procedure. For example, it may be desirable for an operator to combine engine fire, engine failure, and severe engine damage procedures into a single procedure. Inspectors may approve the resulting procedure when validation testing shows the procedure to be clear, easy to use, and if it retains the safeguards of the individual procedures it replaces. If the combined procedure results in a complex and error prone procedure, the inspector shall not approve it.

I. Evaluating the Effectiveness of Procedures

The inspector shall require the operator to present evidence that newly developed procedures are effective. This may be done by analysis, documentation, or validation tests. Tests may be conducted by the manufacturer, the operator, or another competent party (such as a contractor). The inspector or a designated inspector qualified in the aircraft must evaluate the effectiveness of such tests.

IV. NORMAL PROCEDURES.

The normal procedures section of a AOM must contain procedures for each normal operation that flight crewmembers are required to perform. Each normal procedure should be amplified by the operator with sufficient instruction to ensure that the procedure is properly accomplished. Inspectors must ensure that this instruction is thorough enough to provide the least experienced flight crewmember with sufficient information to perform the procedures.

A. Procedures Section of the AOM

Many operators include normal operating checklists and an explanation of how to accomplish each step of the checklists in the normal Procedures Section of the AOM. This is an acceptable practice; however, it is important to understand that an explanation of how to perform the normal checklist is not the only material required in the normal Procedures Section of a AOM. Guidance for operational procedures for which there are no checklists (such as the takeoff procedure) must also be addressed. Procedures for crew co-ordination and for the use of checklists must be included. The Procedures Section of an AOM must contain clearly specified crew duties. For example, the Procedures Section should contain a specific assignment for the crewmember that is responsible for setting power and maintaining directional control when the SIC is conducting a takeoff.

B. Additional Procedures

Inspectors may require the operator to develop and publish normal procedures in a AOM which are not in the AFM, when the procedures are necessary to ensure an adequate level of safety. Instrument approach procedures, adverse weather operations, long range navigation, and special procedures for CAT II and CAT III operations are all examples of required normal procedures which may not be in an AFM or RFM.

C. Procedures for Computer Operations

Operators may need to develop extensive procedures for operating computer-based systems in the cockpit. A description of computer displays and controls does not normally provide a crewmember with adequate information to operate such systems. Procedures for computer operations should be keyed to menus and display prompts. Procedures should be written in an interactive format rather than as a rote listing of keystrokes.

V. MANOEUVRES AND PROCEDURES DOCUMENT.

Operators should publish "detailed descriptions or pictorial displays of the approved normal, abnormal, and emergency manoeuvres, procedures and functions that will be performed during each flight training phase or flight check, indicating those manoeuvres, procedures and functions that are to be performed during the in-flight portions of flight training and flight checks." Operators must obtain approval of the manoeuvres and procedures descriptions before they may be published. Before approving the operator's "manoeuvres and procedures document," Inspectors shall ensure that it contains the tolerances, which must be maintained in training and checking. Inspectors shall ensure that the operator's standards are appropriate for the aircraft being flown and for the operation being conducted

VI. NON-NORMAL AND EMERGENCY PROCEDURES.

Non-normal (or abnormal) and emergency procedures in an AFM are usually presented in more detail than are normal procedures. The steps and the order of steps in these procedures are often critical. ***Inspectors must exercise caution in approving the modification of non-normal and emergency procedures.*** The effects of most procedural steps on the airworthiness of the aircraft are obvious but the effects of some are not. For example, it may be necessary to depressurise a hydraulic system to successfully perform a manual landing gear extension. Deleting a step or a change in the sequence of steps of such a procedure could make the procedure ineffective. ***There have been instances in which operators have erroneously proposed modifying an AFM procedure, and inspectors have unintentionally approved the modification, which invalidated the certification basis of the aircraft.*** Inspectors should use the guidance that follows when evaluating an operator's non-normal or emergency procedures in AFMs or AOMs.

A. Proposal to Modify a Non-Normal or Emergency Procedure

When an operator proposes to modify a non-normal or emergency procedure, the operator must show that the modified procedure does not adversely affect the airworthiness of the aircraft. The operator may establish the safety and effectiveness of proposed procedures by analysis, documentation, or validation tests.

B. Concurrence with the Appropriate Authority

Inspectors shall contact the applicable appropriate authority and obtain concurrence before approving deletion of an item or the rearrangement of items on these checklists. Appropriate authority concurrence is not required if the operator provides evidence that the appropriate authority has already concurred with the identical procedure for another party (such as another operator or manufacturer).

VII. IMMEDIATE ACTIONS.

An immediate action is an action that must be accomplished so expeditiously (in order to avoid or stabilize a hazardous situation) that time is not available for a crewmember to refer to a manual or checklist. Crewmembers must be so familiar with these actions that they can perform them correctly and reliably from memory. Inspectors must ensure that immediate action situations are included in an operator's AFM or AOM, as appropriate. Situations that require immediate action include, but are not limited to the following:

- Imminent threat of crewmember incapacitation
- Imminent threat of loss of aircraft control
- Imminent threat of destruction of a system or component which makes continued safety of the flight and subsequent landing improbable

A. Immediate Action Items

Under this criteria, a flightcrew donning oxygen masks in response to a depressurisation or turning off the fuel and ignition in case of a hot start, are situations requiring mandatory immediate action items. The loss of thrust on a jet engine during cruise, however, would not normally require an immediate action item according to this criteria.

B. Identifying Immediate Action Items

Inspectors must ensure that immediate action items are explicitly identified as such in an operator's AOM. It is not acceptable for immediate action items to be hidden (not specifically identified as an immediate action) in procedures or checklists.

C. Checklists

Certain situations that either require or appear to require immediate action have proven to be a stimulus for evoking incorrect and inappropriate flightcrew actions. Therefore, immediate action items must be strictly limited to only those actions necessary to stabilise the situation. Inspectors must ensure that all remaining actions are accomplished by "challenge do verify" (CDV) checklists. CDV checklists have checklist items that require confirmation from a second crewmember before the step may be taken.

D. Inspector Approval

Inspectors may approve an operator's proposal to replace immediate action items in an AFM procedure with challenge do verify (CDV) checklist procedures in a AOM, provided the operator shows compliance with the criteria in this paragraph and also demonstrates an equivalent level of safety through validation tests.

VIII. MANDATORY CONFIRMATION ITEMS.

There are certain critical procedural steps that shall be confirmed by a second crewmember before the step may be taken. Inspectors must ensure that an operator's procedures, which contain such critical procedural actions, must clearly identify the critical actions and the crewmember who is responsible for giving the confirmation. The types of procedural actions that require this confirmation include the following:

- Actions resulting in the shutting down of an engine.
- Actions resulting in the deactivation of flight controls.
- Actions that if performed incorrectly, in the wrong sequence, or at the wrong time produce a catastrophic result, even if the incorrect action is not highly likely.
- Actions where past experience or analysis has shown that there is a high probability for error or incorrect action and which creates a hazardous situation.

IX. CREWMEMBER ROLES.

The AOM must clearly define the various crewmember roles and responsibilities. Inspectors should use the following guidance when ensuring that the operator clearly states policy and guidance for cockpit management in the AFM or AOM, as applicable.

A. PIC Responsibilities.

The operator's policy and guidance should make it clear that the PIC's primary responsibility is to manage the actions of the crew and the conduct of the flight. While the PIC may delegate the management of the flight and manipulation of the controls to the SIC, the AOM must not indicate that the PIC can delegate the responsibility for safe conduct of the flight.

B. Responsibilities of Flight Crewmembers Not in Command.

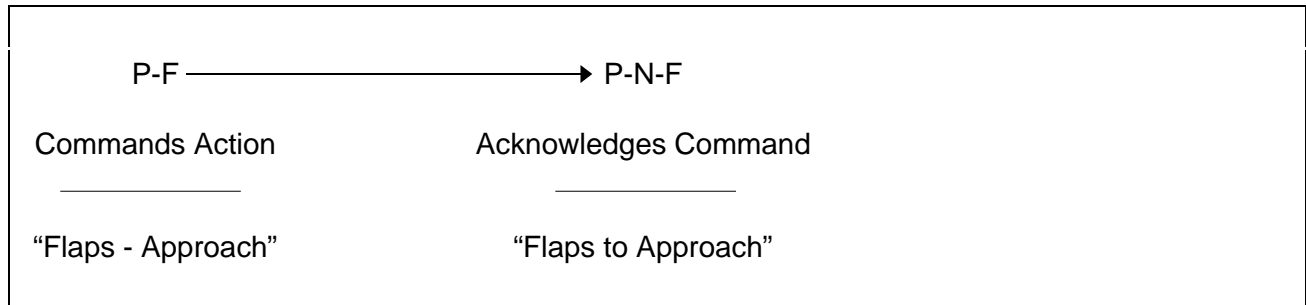
The operator's flight manual should contain policy and guidance to those flight crewmembers not in command, as to their responsibilities to the PIC and their responsibilities for the safe conduct of the flight.

C. SIC (Co-Pilot) Responsibilities.

The AOM must contain guidance for the PIC concerning the conditions and circumstances in which an SIC may operate the aircraft. The operator's policies must delineate the limits of authority delegated to the SIC when the SIC is the pilot flying (P-F). The operator's policies should address crew management in critical situations. For example, there may be certain situations in which the SIC should be the pilot flying (P-F) so that the PIC can concentrate on managing those situations, particularly ensuring that required actions and appropriate checklists are properly accomplished. Procedures for transfer of control must be clearly addressed in the AOM.

D. Communications.

In general, proper cockpit management requires effective communication and co-operative action between crewmembers, which form consecutive, closed loops. An example of this interaction is in the illustration that follows.



E. Co-ordination.

Research has shown that effective flightcrews co-ordinate their actions before any action is required. Inspectors shall ensure that AOMs contain a requirement for briefings and also adequate guidance for the content of those briefings.

X. OPERATIONS NOT EVALUATED IN AIRCRAFT CERTIFICATION.

If the operator proposes to conduct operations, which have not been evaluated during aircraft certification, the inspector must ensure that the operator has developed and obtained approval of procedures for the conduct of the proposed operation. Such operations are often indicated by the absence of a procedure for the operation in the AFM. Examples of such operations could include powerback and taxi with engine shutdown. Inspectors should use the following guidance when evaluating those operations not evaluated during aircraft certification.

A. Specific Procedures for Specific Operations

Inspectors must ensure that each operation conducted must be specifically addressed by a procedure. For example, it should not be assumed that a procedure for shutting down and then restarting an engine during a taxi delay is equivalent to a procedure for delaying an engine start on initial taxi out. The same procedure may not be used for more than one operation unless analysis shows that more than one operation may be safely conducted using the same procedure.

B. Co-ordinating Operations Procedures

Inspectors must ensure that an operational procedure is thoroughly co-ordinated with airworthiness inspectors. Since adverse effects that a procedure could cause to the airworthiness of an aircraft or its systems may not be immediately apparent, the inspector must ensure that co-ordination with

airworthiness is required. For example, a procedure for taxiing with engine shutdown could have a detrimental effect on the landing gear system if high asymmetrical engine thrust is used during sharp turns. If there is any question concerning the effects a procedure may have on the airworthiness of the aircraft, the inspector must co-ordinate with and obtain concurrence from the appropriate authority before granting approval of the procedures.

XI. LIMITATIONS.

Inspectors must ensure that when operating limitations are incorporated in a AOM, that each limitation was transferred from the AFM. Inspectors should use the following guidance when evaluating the limitations of an operator's AOM.

A. AFM Operating Limitations

Inspectors should evaluate the operator's AOM to ensure that all AFM operating limitations are published in the AOM and are clearly identified as AFM limitations. The limitations section of a AOM must contain every limitation from the AFM. Operators may add limitations to AOM's which were not in an AFM. One method of accomplishing this is for the operator to express all operator imposed limitations as policy statements in applicable procedures. When the operator chooses to blend AFM and operator imposed limitations in the limitations section of a AOM, the inspector must ensure that the operator used a method for clearly distinguishing each AFM limitation from the operator imposed limitations.

B. Responsibilities

The operator is responsible for informing crewmembers of all AFM operating limitations. Crewmembers are responsible for observing all AFM limitations. The inspector must ensure that the AOM contains a statement that crewmembers are responsible for being aware of and for observing all limitations.