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01 / 2005
13 JAN

STANDARD OPERATING PROCEDURES (SOP)

1. PURPOSE

1.1 Standard Operating Procedures (SOPs) are universally recognized as basic to safe aviation operations. Effective crew coordination and crew performance, two central concepts of crew resource management (CRM), depend upon the crew's having a shared mental model of each task. That mental model, in turn, is founded on SOPs. This AIC presents background, basic concepts, and philosophy in respect to SOPs. It emphasizes that SOPs should be clear, comprehensive, and readily available in the manuals used by flight deck crew members. This AIC is designed to provide advice and recommendations about development, implementation, and updating of SOPs. Many important topics that should be addressed in SOPs are provided in Appendix 1, Standard Operating Procedures Template. Stabilized Approach, characterized by a constant-angle, constant-rate of descent ending near the touchdown point, where the landing maneuver begins, is among the SOPs specifically identified in this AIC, and is described in Appendix 2, Stabilized Approach: Concepts and Terms. These and the other Appendices following them represent a baseline and a starting point. Start-up Air Operator Certificate (AOC) holder and existing AOC holders should refer to the Template in Appendix 1 and to Stabilized Approach in Appendix 2 to this AIC in developing comprehensive SOPs for use in training programs and in manuals used by their flight deck crewmembers.

1.2 This AIC outlines the requirement for every Air Operator Certificate holder to develop an SOP, being part of its Operations Manual and to be approved by the Department of Civil Aviation.

2. SCOPE

2.1 Appendix 1, consolidates many topics viewed by operators and to be addressed as SOPs in air operator training programs and in the manuals used by air operator flight deck crew members. This AIC does not list every important SOP topic or dictate exactly how each topic should be addressed by an AOC holder. Instead this AIC offers a baseline of topics, to be used as a reference. In practice, each AOC holder's manuals and training programs are unique. Certain topics that do not apply to the operations should be indicated as "not applicable", and, on the other hand, could add other topics not shown in the template when they do apply. This AIC contains guidance intended for use primarily by Air Operators Certificate holder authorized to conduct operations in accordance with MCAR.

3. BACKGROUND

3.1 For many years the International Civil Aviation Organization (ICAO) has identified deficiencies in standard operating procedures as contributing causal factors in aviation accidents. Among the most commonly cited deficiencies involving flight crews has been their non-compliance with established procedures, another has been the non-existence of established procedures in some manuals used by flight crews.

3.2 The ICAO has recognized the importance of SOPs for safe flight operations. Recent amendments to ICAO Annex 6 and PANS OPS Document 8168, Vol. 1, establish that each Members State shall require that SOP's for each phase of flight be contained in the operations manual used by pilots.

3.3 Many Aviation Safety Organizations have concluded that Air Operators perform with higher levels of safety when they establish and adhere to adequate SOPs.

3.4 A study of CFIT accidents found almost 50 percent of the 107 CFIT interventions identified by an analysis team related to the flight crew's failure to adhere to SOPs or the AOC holder's failure to establish adequate SOP's.

4. THE MISSION OF SOPs.

4.1 To achieve consistently safe flight operations through adherence to SOP's that are clear, comprehensive, and readily available to flight crew members.

5. APPLYING THE SOPs TEMPLATE AND OTHER APPENDICES.

5.1 Generally, each SOP topic identified in the template (Appendix 1) is important and should be addressed in some manner by the AOC holder, if applicable. Stabilized Approach (Appendix 2) is a particularly important SOP. Other important SOPs, such as those associated with special operating authority or with new technology, are not shown in the template, but should be addressed as well, when applicable. Because each holder's operations are unique, developing the specific manner in which SOPs are addressed is the task of the AOC holder. Topics expanded and illustrated in the Appendices are for example only and represent renditions of SOPs known to be effective. No requirement is implied or intended to change existing SOPs based solely on these examples. An SOP topic shown in the Appendices may be addressed in detail, including test and diagrams, or in very simple terms.

6. KEY FEATURES OF EFFECTIVE SOPs.

6.1 Many experts agree that implementation of any procedure as an SOP is most effective if:

a. The procedure is appropriate to the situation.

b. The procedure is practical to use.

c. Crew members understand the reasons for the procedure.

d. Pilot Flying (PF), Pilot Not Flying (PNF), and Flight Engineer duties are clearly delineated.

e. Effective training is conducted.

f. The attitudes shown by instructors, check pilots, and managers all reinforce the needs for the procedure.

6.2 If all elements (above) are not consistently implemented, flight crews too easily become participants in an undesirable double standard condoned by instructors, check pilots, and managers. Flight crews may end up doing things one way to satisfy training requirements and check rides, but doing them another way in " real life " during line operations. When a double standard does appear in this way, it should be considered a red flag that a published SOP may not be practical or effective for some reason. That SOP should be reviewed and perhaps changed.

7. THE IMPORTANCE OF UNDERSTANDING THE REASONS FOR AN SOP.

7.1 Effective Feedback. When flight crew members understand the underlying reasons for having SOP, they are better prepared and more eager to offer effective feedback for improvements. The AOC holder, in turn, benefits from more competent feedback in revising existing SOPs and in developing new SOPs. Those benefits include safety, efficiency, and employee morale.

7.2 Troubleshooting. When flight crew members understand the underlying reasons for an SOP, they are generally better prepared to handle a related in-flight problem that may not be explicitly or completely addressed in their operating manuals.

8. COLLABORATING FOR EFFECTIVE SOPs.

8.1 In general, effective SOPs are the product of healthy collaboration among managers and flight operations people, including flight crews. A safety culture promoting continuous feedback from flight crews and others, and continuous revision by the collaborators distinguishes effective SOPs at air operators of all sizes and ages.

8.2 New operators, operators adding a new aircraft fleet, or operators retiring one aircraft fleet for another must be especially diligent in developing SOPs. Collaborators with applicable experience may be more difficult to bring together in those instances.

8.3 For a startup AOC holder, this AIC and its Appendices should be especially valuable tools in developing SOPs. The developers should pay close attention to the approved Airplane Flight Manual (AFM), to AFM revisions and operations bulletins issued by the manufacturer. Desirable partners in the collaboration would certainly include representatives of the airplane manufacturer, pilots having previous experience with the airplane or with the kind of operations planned by the operator, and representatives from the authority, including the principal operations inspector (POI) and members of the Management Team. It is especially important for a new operator to maintain a periodic review process that includes line flight crews. Together, managers and flight crews are able to review the effectiveness of SOPs and to reach valid conclusion for revisions. The review process will be meaningful and effective when managers promote prompt implementation of revisions to SOPs when necessary.

8.4 An existing AOC holder introducing a new airplane fleet should also collaborate using the best resources available, including the AFM and operations bulletins. Experience has shown that representatives of the airplane manufacturer, managers, check pilot, instructors, and line pilots work well together as a team develop effective SOPs. A trial period might be implemented, followed by feedback and revision, in which SOPs are improved. By being part of an iterative process for changes in SOPs, the end user, the flight crew member, is generally inclined to accept the validity of changes and to implement them readily.

8.5 Long-established operators should be careful not to assume too readily that they can operate an airplane recently added to the fleet in the same, standard way as older types or models. Managers, check pilot, and instructors should collaborate using the best resources available, including the AFM and operations bulletins to ensure that SOPs developed or adapted for a new airplane are in fact effective for that aircraft, and are not inappropriate carryovers.

8.6 Safety in commercial aviation continues to depend on good crew performance. Good crew performance, in turn, is founded on standard operating procedures that are clear, comprehensive, and readily available to the flight crew. This AIC provides an SOPs template and many other useful reference in developing SOPs. Development of SOPs is most effective when done by collaboration, using the best resources available in including the end users themselves, the flight crews. Once developed, effective SOPs should be continually reviewed and renewed.

8.7 Any amendment to the SOP should be recorded in the amendment record page so that it could be used to track of latest SOP updates.

8.8 The name of person/authority authorizing the SOP or any amendment should be clearly defined. An example of an approved signatory page of the SOP is as per Appendix 3.

8.9 The list of distribution and control number should be included in the SOP for better control of updates and amendments.

DATO' IR KOK SOO CHON
Director General
Department of Civil Aviation
Malaysia

NOTE ON APPENDICES

The following appendices contain examples of Standard Operating Procedures (SOPs) that are identical to or similar to some SOPs currently is use. Those examples do not represent a rigid DCA view of best practices, which may vary among fleets and among and AOC holders, and may change over time.

Some of the examples may be readily adapted to a AOC holder's flight crew training and operating manuals for various airplane fleets. Others may apply to a certain airplane fleet and may not be adaptable apart from that fleet.

In some cases a term shown in an Appendix is a term used by a AOC holder, not the equivalent term used by the authority. Where the authority would use the term "height above touchdown," or HAT, the example shows that the AOC holder has used the term "above field elevation," or AFE.

APPENDIX 1

STANDARD OPERATING PROCEDURES TEMPLATE

A manual or section in a manual serving as the flight crew's guide to Standard Operating Procedures (SOPs) may double as a training guide. The content should be clear and comprehensive, without necessarily being lengthy. No template could include every topic that might apply unless it was constantly revised. Many topics involving special operating authority or new technology are absent from this template, among them ETOPS (Extended Twins Operations), PRM (Precision Runway Monitor), SMGS (Surface Movement and Guidance System), RNP (Required Navigation Performance) and many others. The following are nevertheless view by industry and authority alike as example of topics that constitute a useful template for developing comprehensive, effective SOPs.

- Captain's authority
- Use of automation
    - The operator's automation philosophy
    - Specific guidance in selection of appropriate levels of automation Auto-pilot/flight
    - Director mode control inputs
    - Flight management systems inputs
- Checklist philosophy
    - Policies and procedures
        - (Who calls for; who reads; who does)
        - Checklist interruptions
        - Checklist ambiguity
        - Checklist couplings
        - Checklist training
    - Format and terminology
    - Type of checklist
        - Challenge-Do-Verify
        - Do-Verify
    - Walk-around
- Checklists
    - Safety check-power on
    - Originating/receiving
    - Before start
    - After start
    - Before taxi
    - Before take-off
    - After take-off
    - Climb check
    - Cruise check
    - Preliminary landing
    - Landing
    - After landing
    - Parking and securing
    - Emergency procedures
    - Non-normal/abnormal procedures
- Communications
    - Who handles radio
    - Primary language used

        ATC
        On the flight deck
    Keeping both pilots in the loop
    Company radio procedures
    Flight deck/cabin signals
    Cabin/flight deck signals
- Briefings
    CFIT risk considered (refer AIC 01/2004 dated 19 Feb 2004)
    Special airport qualification considered
    Temperature corrections considered
    Before takeoff
    Descent/approach/missed approach
- Flight deck access
    On ground/in flight
    Jump seat
    Access signals, keys
- Flight deck discipline
    Sterile cockpit
    Maintaining outside vigilance
    Transfer of control
    Additional duties
    Flight kits
    Headsets/speakers
    Boom mikes/handsets
    Maps/approach charts
    Meals
- Altitude awareness
    Altimeter settings
    Transition level
    Callouts (verification of)
    Minimum safe altitudes (MSA)
    Temperature corrections
- Report times
    Check in/show up
    On flight deck
    Checklist accomplishment
- Maintenance procedures
    Logbooks/previous write-ups
    Open write-ups
    Notification to maintenance of write-ups
    Minimum equipment list (MEL)
        Where it is accessible
    Configuration Deviation List (CDL)
    Crew coordination in ground de-icing
- Flight plans/dispatch procedures
    VFR/IFR
    Icing considerations
    Fuel loads
    Weather package
    Where weather package is available
    Departure procedure climb gradient analysis
- Boarding passengers/cargo
    Carry-on baggage
    Exit row seating

    - Hazardous materials
    - Prisoners/escorted persons
    - Guns onboard
    - Count/load
- Pushback/power back
- Taxiing
    - Single engine
    - All engines
    - On ice or snow
    - Prevention of runway incursion
- Crew Resource Management (CRM)
    - Crew briefings
        - Cabin Crew
        - Flight crew
- Weight & balance/cargo loading
    - Who is responsible for loading cargo, and securing cargo
    - Who prepares the weight & balance data form; who checks it
        - Copy to crew
- Flight deck/cabin crew interchange
    - Boarding
    - Ready to taxi
    - Cabin emergency
    - Prior to take-off/landing
- Take-off
    - Who conducts it
    - Briefing, IFR/VFR
    - Reduced power procedures
    - Tailwind, runway clutter
    - Intersections/land and hold short procedures (LAHSO)
    - Noise abatement procedures
    - Special departure procedures
    - Flight directors
        - Use of: Yes/No
    - Callouts
    - Clean up
    - Loss of engine
        - Reject takeoff
        - After V1
            - Actions/callouts
    - Flap settings
        - Normal
        - Nonstandard and reason for
        - Crosswind
    - Close-in turns
- Climb
    - Speeds
    - Configuration
    - Confirm compliance with climb gradient required in departure procedure
    - Confirm appropriate cold temperature corrections made
- Cruise altitude selection
    - Speeds/weights
- Position reports
    - ATC
    - Company

- Emergency descents
- Holding procedures
  - Procedures for diversion to alternate
- Normal descents
  - Planning beginning of descent point
  - Risk assessment and briefing (see example, paragraph 4.b in this AC)
  - Speed brakes: Yes/No
  - Flaps/gear use
  - Icing considerations
  - Convective activity
- Ground proximity warning system (GPWS or TAWs)
  - Escape maneuver
- TCAS
- Winds shear
  - Avoidance of likely encounters
  - Recognition
  - Recovery / escape maneuver
- Approach philosophy
  - Precision approaches preferred
  - Stabilized approaches standard
  - Used of navigation aids
  - Flight management system (FMS) autopilot
    - Use, and when to discontinue use
  - Approach gates
    - Limits for stabilized approaches
  - Use of radio altimeter
  - Go-arounds: Plan to go around: change plan to land when visual, if stabilized
- Individual approach type
  - All types, including engine-out
- For each type of approach
  - When stabilized approach gates are missed
  - Procedure
  - Callouts
  - Clean-up profile
- Landing
  - Actions and callouts
  - Configuration for conditions
    - Visual approach
    - Low visibility
    - Contaminated runway

  Close-in turns
  Crosswind
  Rejected
  Transfer of control after first officer landing

APPENDIX 2

STABILIZED APPROACH

Stabilized Approach Requirements

Maintaining a stable speed, descent rate, and vertical/lateral flight path in landing configuration is commonly referred to as the stabilized approach concept.

Any significant deviation from planned flight path, airspeed, or descent rate should be announced. The decision to execute a go-around is no indication of poor performance

Note: Do not attempt to land from an unstable approach

Recommended Elements of a Stabilized Approach

The following recommendations are consistent with criteria developed by the Flight Safety Foundation.

All approaches should be stabilized by 1,000 feet above airport elevation in instrument meteorological conditions (IMC) and by 500 feet above airport elevation in visual meteorological conditions (VMC). An approach is considered stabilized when all of the following criteria are met:

- The aircraft is in the correct flight path
- Only small changes in heading/pitch are required to maintain the correct flight path
- The aircraft speed is not more than VREF+20 knots indicated airspeed and not less than VREF
- The aircraft is in the correct landing configuration
- Sink rate is no greater than 1,000 fpm; if an approach requires a sink rate-greater than 1,000 fpm, a special briefing should be conducted
- Power setting is appropriate for the aircraft configuration
- All briefings and checklists have been conducted

Specific types of approaches are stabilized if they also fulfill the following:

- ILS approaches should be flown within one dot of the glideslope and localizer
- A category II or category III approach should be flown within the expanded localizer band
- During a circling approach, wings should be level on final when the aircraft reaches 300 feet above airport elevation

Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing

Note: An approach that becomes unstabilized below 1,000 feet above airport elevation in IMC or below 500 feet airport elevation in VMC requires an immediate go-around

These conditions should be maintained throughout the rest of the approach for it to be considered a stabilized approach. If the above criteria cannot be established and maintained at an below 500 feet AFE (above field elevation) , initiate a go-around

At 100 feet HAT (height above threshold) for all visual approaches, the aircraft should be positioned so the flight deck is within, and tracking so as to remain within, the lateral confines of the runway extended.

As the aircraft crosses the runway threshold it should be:

- Stabilized on target airspeed to within + 10 knots until arresting descent rate at flare
- On a stabilized flight path using normal maneuvering
- Positioned to make a normal landing in the touchdown zone (i.e., first 3,000 feet or first third of the runway, whichever is less)

Initiate a go-around if the above criteria cannot be maintained

Maneuvering (including runway changes and circling)

When maneuvering below 500 feet, be cautious of the following:

- Descent rate change to acquire glide path
- Runway lateral displacement
- Tailwind/crosswind components
- Runway length available

Mandatory Missed Approach

On all instrument approaches, execute a immediate missed approach:

- If a navigation radio or flight instrument failure occurs which affects the ability to safely complete the approach in instrument conditions
- When on ILS final approach, in instrument conditions, and either the localizer and/or glide slope indicator shows full deflection
- When the navigation instruments show significant disagreement and visual contact with the runway has not been made
- When on an RNP based approach, and an FMC alerting message indicates that ANP exceeds RNP
- When on radar approach and radio communication is lost

APPENDIX 3

ABC AIRLINES

STANDARD OPERATING PROCEDURES (SOP)

APPROVED BY: _____

Name
Air Operator's appointment holder

APPROVED BY:

Department of Civil Aviation
Malaysia

Manual No :_____

Issued to :_____

Date Issued :_____
