Safety Information Bulletin

CAAS SIB No.	2016-05
Issued	22 November 2016
Subject	Checklist Usage in General Aviation
Ref. Publications	1) Singapore Air Navigation Order (ANO), Part V 2) Singapore General Aviation Requirements (SGAR) chapter 3 (for large/turbine powered aeroplanes and corporate operations) 3) Aircraft Manufactures' Flight Manuals
Purpose	To remind operators and pilots of the importance of maintaining checklist discipline
Applicability	All Singapore General Aviation Operators and Pilots
Cancellation	N/A
Background	In January 2016, a light aircraft was involved in a landing accident at Seletar Airport. The investigation report concluded that non-compliance with the checklists provided in the approved flight manual, was a causal factor in the accident. The aircraft checklist is considered a critical element in pilot standardization and cockpit safety. However, the improper use, or non-use of the checklist by pilots is often cited as a major contributing factor to aircraft accidents.
Why we need Checklists	The primary purpose of the checklist is to ensure that the crew will properly configure the airplane for any given segment of flight. It forms the basis of procedural standardization in the cockpit. The checklist, when used correctly is intended to satisfy the following objectives:

1. Provide a standard foundation for verifying aircraft configuration.

2. Reducing the potential effects of pilots' psychological and physiological condition.

3. Provide a sequential framework to meet internal and external cockpit operational requirements.

4. Allow mutual cross checking among crew members.

5. Define the duties of each crew member in order to distribute cockpit workload.

6. Ensure all crew members are "in the loop" when configuring the airplane.

7. Serve as a quality control tool by flight managers and regulators.

Checklist Philosophy

There are two primary methods of conducting a checklist. The first is what is often referred to as the "read and do" checklist. Using this method, there is the potential to miss checklist items. The other common method is the "challenge-verification-response" checklist. With this method, the action is taken by memory, following which the checklist will be used to verify that all the items listed on the checklist have been correctly accomplished. This checklist method is in common use with commercial operators.

Checklist Memory Items

Certain time-critical emergency procedures are memory items both in GA and in commercial operations. For an engine failure at low altitude, for example, there is a procedure you should have memorized and be able to execute without delay. These memory items should have associated checklists that can be accomplished if time permits to make sure that the appropriate actions were taken. Any emergency checklist that does not back up a memory item should be used as a do-list.

In small general aviation aircraft, a pilot will often action normal checklist items by memory rather than by reference to the printed checklist. The following example is the BUMPH mnemonic, which is in widespread use.

- **B**rakes - Off

- **U**ndercarriage – Down and locked

- **M**ixture – Set full rich

- **P**ropeller – Set full fine pitch (variable pitch)

- **H**atches and Harnesses – Secured

Other mnemonics go further and add items such as fuel pumps and transponder for example, depending on the complexity of the aircraft.

Human Factors and Checklist Discipline

A mnemonic checklist can be useful, particularly when operating single crew. But by definition, each item is a vital step, and the omission of any of these has the potential for the aircraft not being configured correctly for the phase of flight.

It should also be noted that as the complexity of the aircraft increases, so does the significance of checklist discipline. An example of this is retractable gear. If the BUMPH mnemonic is missed or abbreviated, gear extension may be not be actioned and the redundancy then falls on the gear warning horn/light.

Many pilots use internal as well as external cockpit cues to aid them in initiating the checklist. For example, the BEFORE START checklist can be cued by closing of aircraft doors; the TAXI checklist after receiving the taxi clearance; the BEFORE TAKEOFF checklist by reaching the hold line before the runway.

Checklist cues are not part of the standard operating procedures (SOP) and because they are personal techniques, can result in mis-management of checklists. The cues are not always present or

applicable, and if pilots are occupied with other tasks, cues can pass unnoticed.

In commercial aviation, "Flow Patterns" are becoming more common. They are also starting to find favor within general aviation. The advantage of this technique is that checklist actions are carried out in a logical sequence or flow, thereby reducing the chance of missing items.

In the event of distractions or interruptions such as ATC, the potential to miss one or more checklist items becomes a threat.

Reducing Checklist Errors

The first step in reducing the likelihood of a checklist error or omission, is to have a thorough understanding of the checklist. If we understand the significance of each checklist step, we are more likely to action a checklist correctly.

The use of hands and fingers to touch, or point to, appropriate controls, switches, and displays while conducting the checklist is recommended.

Once a checklist is started, it should be completed systematically. Workload resource management should be employed and the checklist actioned at a suitable time when interruption is less likely. In a multi crew environment, the pilot monitoring should remind the pilot flying of checklist progress and both pilots should be responsible for confirming checklist actions are completed. With single crew, there is no such reminder and a mental note must be made to resume any incomplete checklist.

Summary

Regardless of whether a checklist is actioned from a written text or by memory, it is essential that the checklist is followed closely and that all the steps are carried out correctly. The checklist should be considered as an integral part of the safe operation of an aircraft.

At any time progress of the checklist is in doubt, the safest option is to run the checklist again. For example, a change of runway for takeoff or landing would normally require duplication of some checklist items so in this event the checklist should be repeated.

Regulatory Obligation

Regulations on the use of aircraft checklists are specified in SGAR, chapter 3 (for large/turbine powered aeroplanes and corporate operations)

ANO Part V, Operation of Aircraft, Paragraph 31

Recommendation(s)

Taking into consideration the risk posed by incorrect checklist usage, operators are recommended to:

Remind pilots of their responsibilty to maintain checklist discipline at all times.

Contact(s)

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