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Attachment 14 – Checklist Information

OPERATIONAL FACTORS/HUMAN PERFORMANCE

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Checklist Information

Introduction

The Quick Reference Handbook (QRH) contains all non-normal checklists used by the flight crew to manage non-normal situations. The non-normal checklists chapter contains checklists used by the flight crew to cope with non-normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

Most checklists correspond to a light, alert, or EICAS alert message. In some cases, the master WARNING or master CAUTION, and miscellaneous lights also illuminate to indicate the non-normal condition. These lights, alerts, and EICAS alert messages indicate a non-normal condition and are the cues to select and do the associated checklist.

Checklists without a light, alert, or EICAS alert message (such as Ditching Preparation) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Fuel Leak Engine is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

All checklists have condition statements. The condition statement briefly describes the situation that caused the light, alert, or EICAS alert message. Unannunciated checklists also have condition statements to help in understanding the reason for the checklist.

Some checklists have objective statements. The objective statement briefly describes the expected result of doing the checklist or briefly describes the reason for steps in the checklist.

Checklists can have both memory and reference items. Memory items are critical steps that must be done before reading the checklist. The last memory item is followed by a red dashed horizontal line. Reference items are actions to be done while reading the checklist.

Some checklists have supplemental information at the end of the checklist. The supplemental information provides data the crew may wish to consider. The supplemental information does not need to be read.

Checklists that need a quick response are listed in the Quick Action Index. In each system section, Quick Action Index checklists are listed first, followed by checklists that are not in the Quick Action Index. The titles of Quick Action Index checklists are printed in **bold** type. Checklist titles in upper case (such as AUTOBRAKES) are annunciated by a light, alert, or EICAS alert message. Checklist titles in upper and lower case (such as Volcanic Ash) are not annunciated.

A few checklist titles appear in larger print to make it easier for the flight crew to locate the checklist while wearing an oxygen mask and goggles.

Troubleshooting

Troubleshooting can be defined as:

- taking steps beyond a published non-normal checklist in an effort to improve or correct a non-normal condition
- initiating an annunciated checklist without an EICAS alert message to improve or correct a perceived non-normal condition
- initiating diagnostic actions

Examples of troubleshooting are:

- attempting to reset a system by cycling a system control or circuit breaker when not directed by the non-normal checklist
- using maintenance-level information to diagnose or take action
- using switches or controls intended only for maintenance

Troubleshooting beyond checklist directed actions is rarely helpful and has caused further loss of system function or failure. In some cases, accidents and incidents have resulted. The crew should consider additional actions beyond the checklist only when completion of the published checklist steps clearly results in an unacceptable situation. In the case of airplane controllability problems when a safe landing is considered unlikely, airplane handling evaluations with gear, flaps or speedbrakes extended may be appropriate. In the case of jammed flight controls, do not attempt troubleshooting beyond the actions directed in the non-normal checklist unless the airplane cannot be safely landed with the existing condition. Always comply with non-normal checklist actions to the extend possible.

Note: Flight crew entry into an electronics compartment in flight is not recommended.

Non-Normal Checklist Operation

Non–normal checklists start with steps to correct the situation. If needed, information for planning the rest of the flight is included. When special items are needed to configure the airplane for landing, the items are included in the Deferred Items section of the checklist.

While every attempt is made to supply needed non–normal checklists, it is not possible to develop checklists for all conceivable situations. In some smoke, fire or fumes situations, the flight crew may need to move between the Smoke, Fire or Fumes checklist and the Smoke or Fumes Removal checklist. In some multiple failure situations, the flight crew may need to combine the elements of more than one checklist. In all situations, the Captain must assess the situation and use good judgment to determine the safest course of action.

It should be noted that, in determining the safest course of action, troubleshooting, i.e., taking steps beyond published non-normal checklist steps, may cause further loss of system function or system failure. Troubleshooting should only be considered when completion of the published non-normal checklist results in an unacceptable situation.

There are some situations where the flight crew must land at the nearest suitable airport. These situations include, but are not limited to, conditions where:

- the non–normal checklist includes the item "Plan to land at the nearest suitable airport."
- fire or smoke continues
- only one AC power source remains (engine or APU generator)
- any other situation determined by the flight crew to have a significant adverse effect on safety if the flight is continued.

It must be stressed that for smoke that continues or a fire that cannot be positively confirmed to be completely extinguished, the earliest possible descent, landing, and evacuation must be done.

If a smoke, fire or fumes situation becomes uncontrollable, the flight crew should consider an immediate landing. Immediate landing implies immediate diversion to a runway. However, in a severe situation, the flight crew should consider an overweight landing, a tailwind landing, an off-airport landing, or a ditching.

Checklists directing an engine shutdown must be evaluated by the captain to determine whether an actual shutdown or operation at reduced thrust is the safest course of action. Consideration must be given to the probable effects of running the engine at reduced thrust.

There are no non–normal checklists for the loss of an engine indication or automatic display of the secondary engine indications. Continue normal engine operation unless an EICAS alert message shows or a limit is exceeded.

Non–normal checklists also assume:

- During engine start and before takeoff, the associated non–normal checklist is done if a light, alert, or EICAS alert message is shown or a non-normal situation is identified. After completion of the checklist, the Dispatch Deviations Guide or operator equivalent is consulted to determine if Minimum Equipment List dispatch relief is available.
- System controls are in the normal configuration for the phase of flight before the start of the non–normal checklist.
- If the master WARNING or master CAUTION, and miscellaneous lights illuminate, all related amber and red lights are reviewed to assist in recognizing the cause(s) of the alert.
- Aural alerts are silenced and the system is reset by the flight crew as soon as the cause of the alert is recognized.

- The EICAS message list is cancelled after all checklists are complete or on hold so that future messages are more noticeable.
- The EMERGENCY position of the oxygen regulator is used when needed to supply positive pressure in the masks and goggles to remove contaminants. The 100% position of the oxygen regulator is used when positive pressure is not needed but contamination of the flight deck air exists. The Normal position of the oxygen regulator is used if prolonged use is needed and the situation allows. Normal boom microphone operation is restored when oxygen is no longer in use.
- Indicator lights are tested to verify suspected faults.
- Flight crew reset of a tripped fuel pump circuit breaker or fuel pump control circuit breaker is prohibited. In flight, reset of any other tripped circuit breaker is not recommended. However, these other tripped circuit breakers may be reset once, after a short cooling period (approximately 2 minutes), if in the judgment of the captain, the situation resulting from the circuit breaker trip has a significant adverse effect on safety. On the ground, flight crew reset of any other tripped circuit breaker should only be done after maintenance has determined that it is safe to reset the circuit breaker.
- Flight crew cycling (pulling and resetting) of circuit breakers to clear a non-normal situation is not recommended, unless directed by a non-normal checklist.
- When a non-normal checklist directs the flight crew to attempt only one reset of a switch per flight, a second reset of the switch should not be done until maintenance has cleared the malfunction.

Non-Normal Checklist Use

If a checklist or a step in a checklist is not applicable to all airplanes, airplane effectivity information is included in the checklist. Airplane effectivity can be listed by airplane number, registry number, serial number or tabulation number. If a checklist is applicable to some but not all airplanes, airplane effectivity is centered below the checklist title. If a step in a checklist is applicable to some but not all airplanes, airplane effectivity is included above the step. If a checklist or a step in a checklist is applicable to all airplanes, airplane effectivity information is not included.

Non–normal checklist use starts when the airplane flight path and configuration are correctly established. Only a few situations need an immediate response. Usually, time is available to assess the situation before corrective action is started. **All actions must then be coordinated under the Captain's supervision** and done in a deliberate, systematic manner. Flight path control must never be compromised.

When a non–normal situation occurs, at the direction of the pilot flying, both crewmembers do all memory items in their areas of responsibility without delay.

The pilot flying calls for the checklist when:

- the flight path is under control
- the airplane is not in a critical phase of flight (such as takeoff or landing)
- all memory items are complete.

The pilot monitoring reads aloud:

- the checklist title
- messages (if applicable)
- as much of the condition statement as needed to verify that the correct checklist has been selected
- as much of the objective statement (if applicable) as needed to understand the expected result of doing the checklist.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

For checklists with memory items, the pilot monitoring first verifies that each memory item has been done. The checklist is normally read aloud during this verification. The pilot flying does not need to respond except for items that are not in agreement with the checklist. The item numbers do not need to be read.

Non-memory items are called reference items. The pilot monitoring reads aloud the reference items, including:

- the precaution (if any)
- the response or action
- any amplifying information.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood. The item numbers do not need to be read.

The word “Confirm” is added to checklist items when both crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for:

- an engine thrust lever
- a fuel control switch
- an engine or APU fire switch, or a cargo fire arm switch
- a generator drive disconnect switch.

This does not apply to the Dual Engine Failure checklist.

With the airplane stationary on the ground:

- the captain and the first officer take action based on preflight and postflight areas of responsibility.

With the airplane in flight or in motion on the ground:

- the pilot flying and the pilot monitoring take action based on each crewmember's Areas of Responsibility.

After moving the control, the crewmember taking the action also states the checklist response.

Checklists include an Inoperative Items table only when the condition of the items is needed for planning the rest of the flight and the condition is not indicated by a light, alert, or EICAS alert message. The inoperative items, including the consequences (if any), are read aloud by the pilot monitoring. The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

Consequential EICAS alert messages can show as a result of a primary failure condition (such as RUDDER RATIO as a result of HYDRAULIC SYSTEM PRESSURE (L Only)) or as a result of doing a non–normal checklist (such as L PACK OFF or R PACK OFF as a result of doing the Smoke, Fire or Fumes checklist). Do the checklists for consequential EICAS alert messages, unless the statement "Do not accomplish the following checklists:" is included. All consequential EICAS alert messages may not show while doing the primary checklist, depending on operational circumstances.

After completion of the non–normal checklist, normal procedures are used to configure the airplane for each phase of flight.

When there are no deferred items, the DESCENT, APPROACH and LANDING normal checklists are used to verify that the configuration is correct for each phase of flight.

When there are deferred items, the non-normal checklist will include the item "**Checklist Complete Except Deferred Items.**" The pilot flying is to be made aware when there are deferred items. These items are included in the Deferred Items section of the checklist and may be delayed until the usual point during descent, approach or landing.

The deferred items are read aloud by the pilot monitoring. The pilot flying or the pilot monitoring takes action based on each crewmember's area of responsibility. After moving the control, the crewmember taking the action also states the response.

Each checklist has a checklist complete symbol at the end. The following symbol indicates that the checklist is complete:

The checklist complete symbol can also be in the body of the checklist. This only occurs when a checklist divides into two or more paths. Each path can have a checklist complete symbol at the end. The flight crew does not need to continue reading the checklist after the checklist complete symbol.

After completion of each non–normal checklist, the pilot monitoring states "_____ *Checklist Complete*."

Supplemental information at the end of the checklist is not required to be read.

The flight crew must be aware that checklists cannot be created for all conceivable situations and are not intended to replace good judgment. In some situations, at the captain's discretion, deviation from a checklist may be needed.

Non-Normal Checklist Legend

Redirection Symbol

The redirection symbol is used in two ways:

- In the Table of Contents of a system section, to direct the flight crew to a different system section.
- In a non-normal checklist, with the word “Go to”, to direct the flight crew to a different checklist or to a different step in the current checklist.

Separator Symbol

The separator symbol is used in two ways:

- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

Task Divider Symbol

The task divider symbol is used to indicate the end of one task and the beginning of another task.

Decision Symbol

Choose one:

The decision symbol is used to identify possible choices.

Precaution Symbol

The precaution symbol is used to identify information the flight crew must consider before taking the action.

Special Text Definitions

The following levels of written advisories are used throughout the Operations Manuals:

- **Warning** – An operating procedure, technique, etc., that may result in personal injury or loss of life if not carefully followed.
- **Caution** – An operating procedure, technique, etc., that may result in damage to equipment if not carefully followed.
- **Note** – An operating procedure, technique, etc., considered essential to emphasize. Information contained in notes may also be safety related.

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