

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
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Attachment 32 - UPS Pilot Duties

**OPERATIONS/HUMAN PERFORMANCE SUPPORT TO
THE U.S. ACCREDITED REPRESENTATIVE**

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A. Normal Pilot Duties



GENERAL

INTRODUCTION

This chapter contains normal procedures used to operate UPS B747-400 aircraft.

Normal procedures are used by the trained flight crew to ensure that the aircraft condition is acceptable for flight and that the cockpit is correctly configured for each phase of flight. These procedures assume that all systems are operating normally and that automated features are fully utilized.

Normal procedures are performed from recall and follow a panel flow pattern. These procedures are designed to minimize crew workload and are consistent with automated flight deck technology. If the correct indication is not observed during accomplishment of procedures, verify controls are positioned correctly. If necessary, check appropriate circuit breaker(s) and test the related system light(s). Maintenance must first determine that it is safe to reset a tripped circuit breaker on the ground.

Exterior lighting, cockpit lighting and personal comfort items such as shoulder heaters are systems that are assumed to have obvious procedural requirements and are not addressed in this chapter.

Phase of flight duties beginning with engine start and ending with the landing roll, are presented in this chapter in matrix format.

Aircraft Variants

The B747-400F "Freighter" aircraft is the baseline aircraft for all UPS procedures. Normal procedures that are specific to the Freighter or BCF aircraft are annotated (**Freighter**) or (**BCF**) at the beginning of the procedural step.

In some cases, certain procedures may only be applicable to individual tail number(s). In this situation, the applicable procedure is annotated with tail number effectivity (e.g., 578UP).

Procedures with no annotation apply to all aircraft.

DETERMINING AIRCRAFT STATUS

Before engine start, system lights or indications verify system status, condition and configuration.

NOTE: Flight crews should not remove and re-apply electrical power in an effort to clear FMC memory, EICAS messages or systems faults. Maintenance personnel may cycle electrical power in accordance with maintenance procedures.

Use of EICAS Status Display

The EICAS Status display should be reviewed before engine start to determine if messages are displayed which may affect dispatch. If any Status message is displayed, contact maintenance and refer to the Minimum Equipment List (MEL) to determine if dispatch relief is available.

EICAS Status messages observed after engine start and prior to takeoff require maintenance action. Refer to MEL to determine if dispatch relief is available.

EICAS Status messages displayed inflight do not require any flight crew action. Any message requiring crew attention will appear as an EICAS Alert message (Warning, Caution, or Advisory). The MEL should not be used inflight. A logbook entry should be made upon arrival at the destination for any displayed Status messages.

EICAS Alert Messages

EICAS Alert messages are the primary means of alerting the flight crew to non-normal conditions or improper configuration. EICAS Alert messages displayed after engine start require accomplishment of the appropriate non-normal procedure. If an EICAS Alert message is displayed after engine start (prior to takeoff), the MEL must be consulted to determine if dispatch relief is available.

Printed Copy is for Reference Only

CHAP: 3
PAGE: 2
REV : 8
DATE: 03/04/09

B747-400 AIRCRAFT OPERATING MANUAL



Flight Crew Use of Central Maintenance Computer

The Central Maintenance Computer (CMC) is designed to be used by maintenance personnel in the monitoring and troubleshooting of aircraft systems. Flight crews are not trained in the use of the CMC and are not authorized to access the CMC on the ground or in flight. The only exception to this are flight crews who have been trained to utilize the CMC during aircraft acceptance or functional check flights.

CREWMEMBER DUTIES

Flight crewmember duties have been organized in accordance with an area of responsibility concept. Each crewmember is assigned a cockpit area where the crewmember initiates actions for required procedures. The Flow Pattern for Cockpit Preparation (this chapter) describes the crewmember's area of responsibility and flow for each panel. A normal panel flow is encouraged; however, certain items may be handled in the most logical sequence for existing conditions (e.g., air conditioning, flight plan loading, etc.). Actions outside the crewmember's area of responsibility are initiated at the direction of the Captain.

NOTE: The Captain may delegate tasks to the IRO if one is assigned to the flight.

NORMAL CHECKLIST PHILOSOPHY

When the aircraft is on the ground, checklists will be called for by the Captain and read by the First Officer (F/O). While in flight, all checklists will be called for by the Pilot Flying (PF) and read by the Pilot Monitoring (PM).

When the F/O is flying the aircraft, he will perform the duties listed under PF and the Captain will perform the duties listed under PM. However, the Captain retains final authority for all actions directed and performed.

When any checklist is temporarily interrupted, the crewmember reading the checklist will stop the checklist at the current item until the interruption is over, then resume and complete the checklist. However, when a lengthy interruption occurs, the entire checklist should be accomplished from the beginning at the end of the interruption.

The After Takeoff checklist is accomplished silently by the PM.

Following the completion of each normal checklist, the pilot accomplishing the checklist will state "_____ checklist complete." Checklist items containing the response "AS REQUIRED" will be responded to with the actual switch or control position.

CREW COMMUNICATIONS

Positive communications between crewmembers is essential for safety. If any crewmember is unsure of a command, clearance or request, clarification must be received. Commands or requests for checklists and/or configuration changes by the PF will be repeated by the PM. It is important that all flight deck crewmembers identify and communicate any situation that appears unsafe or out of the ordinary. Experience has proven that the most effective way to maintain the safety of flight and resolve these situations is to combine the skill and experience of all crewmembers in the decision making process to determine the safest course of action.

CIRCUIT BREAKER POLICY

WARNING: DO NOT RESET A TRIPPED FUEL PUMP CIRCUIT BREAKER.

Cycling (pulling and resetting) circuit breakers to clear any non-normal condition is not permitted, unless directed by non-normal checklist or other crew procedure.

While on the ground, a tripped circuit breaker may be reset by the flight crew after maintenance has determined that it is safe to do so.

Printed Copy is for Reference Only



B747-400 AIRCRAFT OPERATING MANUAL

CHAP: 3
PAGE: 3
REV : 8
DATE: 03/04/09

While inflight, resetting a tripped circuit breaker is not recommended. However, a tripped circuit breaker may be reset if in the judgment of the Captain, the situation resulting from the circuit breaker trip has a significant adverse effect on safety.

In any case, only one reset of a tripped circuit breaker should be attempted and then only after a cooling period of approximately 2 minutes.

AUTOFLIGHT AND FLIGHT MANAGEMENT SYSTEM POLICY

When an Autopilot Flight Director System (AFDS) or Flight Management System (FMS) mode change is selected or occurs automatically, the appropriate annunciations must be verified on the Primary Flight Display (PFD) Flight Mode Annunciator (FMA) display by both pilots. The PFD FMA display is the primary indication of AFDS and FMS mode status.

Flight crews should utilize available automated systems during normal flight operations. During non-normal flight operations, crewmembers should utilize automation capabilities to the extent that use of such systems reduces cockpit workload and allows compliance with AOM limitations and non-normal procedures. Automated systems are not intended to correct abnormal or unusual flight situations, i.e., unsafe terrain clearance or unusual flight attitudes. If these flight conditions are encountered, the PF must immediately resort to manual flight and comply with established escape or recovery procedures.

Automated systems are reliable, offer multiple levels of automation and generally perform their designed tasks well. In most cases, crewmembers may use their discretion in choosing the most appropriate level of automation consistent with the flight situation.

Crewmembers must be aware that continual, unquestioned reliance on automated systems may lead to complacency in monitoring autoflight system performance and hamper the ability to recognize a failure or unexpected automation behavior. It is imperative that crewmembers maintain automation mode and flight path awareness at all times. Particular attention must be given to aircraft control and speed awareness when operating the aircraft during periods of split automated system usage (i.e., autothrottles off with autopilot on, etc.). When manually flying the aircraft, the flight directors should be turned off if the provided guidance is not being followed.

In the event that the automated systems provide flight guidance or aircraft control that is not consistent with safe operation or an ATC clearance, the crew should immediately resort to manual control, a lower level of automation or the use of raw data navigation. Flight path awareness and compliance with ATC clearances are required regardless of the use of any automated system.

**CAUTION: IF AUTOTHROTTLES
RETARD OR ADVANCE
THROTTLES
ASYMMETRICALLY,
IMMEDIATELY DISCONNECT
AUTOTHROTTLES AND
CONTROL THRUST
MANUALLY.**

USE OF SYNOPTIC DISPLAYS

Synoptic displays are provided as a means of assisting the flight crew in rapidly understanding the status of aircraft systems. However, crews should not rely solely on the displays for determining aircraft status. Flight crews are encouraged to select a display at any time they feel it is the most efficient way to obtain desired information. Synoptic displays should be used as necessary to review desired information and should then be deselected.

Printed Copy is for Reference Only

CHAP: 3
PAGE: 4
REV : 8
DATE: 03/04/09

B747-400 AIRCRAFT OPERATING MANUAL



If synoptic displays are used in conjunction with accomplishment of normal or non-normal procedures, it must be ensured that their use does not distract from the intended task. This is particularly true when accomplishing non-normal procedures. Decisions regarding non-normal situations should be based on EICAS messages and other flight deck indications, not synoptic displays.

Synoptic displays are generated by the status of valve positions, pump status, fluid levels, system breakers, etc. Therefore, displays MAY or MAY NOT represent actual system operation.

CREW COORDINATION

Control Display Unit Operation

On the ground, Control Display Unit (CDU) manipulations are normally performed by the F/O and verified by the Captain.

Inflight, CDU manipulations are usually accomplished by the PM and verified by the PF prior to execution. CDU manipulations should be accomplished prior to high workload periods such as departure, arrival or holding. During high workload periods, using basic autopilot modes such as heading select, flight level change, and altitude/speed intervention features along with the use of the ND MAP display may be more efficient than making complex CDU changes.

FMC Route Modifications

When ATC issues a revised route clearance, the flight crew must ensure immediate compliance. Simple route modifications such as Direct-to can normally be accomplished using the FMS without back-up. More complex route modifications or those which cannot be input into the FMC expeditiously may require using the FIX page or manually tuning the navaid to ensure immediate compliance.

If a route modification cannot be input into the FMC expeditiously, the PM must immediately provide primary navigation data to the PF. This can be accomplished by manually tuning the navaid on the NAV/RAD page and using bearing pointer, ND VOR mode or the FMC generated green radial display. It is also acceptable to use the FIX page, if desired. The PF should continue to use backup data to ensure compliance with the revised clearance until the FMC route has been modified and verified to be correct.

Mode Control Panel

When an autopilot is engaged, the PF should make all Mode Control Panel (MCP) mode selections exclusive of the altitude window. It is recommended to verbalize MCP changes to increase the PM's situational awareness. When an autopilot is not engaged, the PM should make all MCP selections at the direction of the PF. The PM should repeat the PF's commands to ensure that the proper command is executed.

Autopilot Operation

An autopilot may be engaged at or above 250 feet AGL after takeoff. It is recommended that each crewmember normally use the Center autopilot due to its ability to use either stabilizer trim system. Both pilots must observe FMA indications to ensure proper autopilot engagement. When disengaging the autopilot and/or autothrottles, the PF will verbally state that the autopilot/autothrottles are being disengaged to ensure that both pilots are aware of autoflight system status.

If the autopilot is not providing precise aircraft control or maintaining the desired flight path, the PF must immediately disconnect the autopilot and assume manual control of the aircraft. After the aircraft flight path is stabilized, the autopilot may be re-engaged if desired.

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B747-400 AIRCRAFT OPERATING MANUAL

CHAP: 3
PAGE: 5
REV : 8
DATE: 03/04/09

Setting Assigned Altitudes

The PM will acknowledge all assigned altitudes and set the altitude in the MCP altitude window. The PM will then announce the altitude out loud and point at the PFD selected altitude index. The PM will continue to point at the PFD selected altitude index until receiving altitude verification from the PF.

The PF will verify proper altitude displayed on PFD selected altitude index, then point to the PFD selected altitude index and announce the altitude out loud.

The PF will not engage an AFDS pitch mode or depart the previous altitude until the new assigned altitude is set and verified.

NOTE: The above procedure will be used to verify all altitudes set in the MCP altitude window after engine start.

When ATC issues an "at or below" altitude crossing restriction during climb, or an "at or above" restriction during descent, the PM will set the crossing restriction in the MCP altitude window regardless of the AFDS pitch mode being utilized. This ensures that the crossing restriction will be met regardless of the pitch mode being utilized. After it has been determined the crossing restriction have been met, the PM will set the next crossing restriction or final ATC assigned altitude in the MCP altitude window.

ENHANCED GPWS USAGE

One pilot should select the ND terrain data display during all takeoffs and landings where terrain may be a factor, except where procedures dictate that the system be overridden due to database or GPS position inaccuracies. The Captain will determine which pilot will have terrain data displayed as appropriate for the current operation.

Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with an EGPWS warning.

The terrain display is to be used as a situational awareness tool only and must not be used as the sole means to determine terrain/obstacle avoidance.

The EGPWS database only includes catalogued man-made obstructions located in North America, and is not all-inclusive. Terrain information is included for the entire world.

RADIO ALTIMETER USAGE

The radio altimeter may be used to cross-check the pressure altimeter over known terrain in the terminal area.

For Category II/III approaches, the PFD Decision Height (DH) indication will be utilized in accordance with B747-400 Category II/III procedures.

For Category I ILS approaches, the Radio/Baro selector will be set to BARO and the PFD DH indication will be set to a negative value. The Baro minimum indication will be set to the barometric Decision Altitude (DA).

For non-precision approaches, the Radio/Baro selector will be set to BARO and the PFD DH indication will be set to a negative value. The Baro minimum indication will be set to the DA/MDA.

For visual approaches, the Radio/Baro selector and minimums indications may be set as desired.

USE OF AUTOPILOT FOR INSTRUMENT APPROACHES

ILS Approaches - RVR less than 4000

If available, the autopilot(s) will be used for all ILS approaches when the reported visibility/RVR is less than 3/4 mile or 4000 RVR. If an autopilot is not available, the Captain must fly the approach and landing when visibility/RVR is less than 3/4 mile/4000 RVR.

Non-Precision Approaches

If available, use of the autopilot and autothrottles is encouraged for all non-precision approaches. During a non-precision approach, the autopilot must be disconnected no lower than 50 feet below DA/MDA.

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B. Non-Normal Pilot Duties



B747-400 AIRCRAFT OPERATING MANUAL

CHAP: 2
PAGE: INTRO 3
REV : 1
DATE: 07/01/07

NON-NORMAL CHECKLIST ASSUMPTIONS

Non-normal checklists assume that the following conditions have been met prior to beginning any non-normal checklist:

- During engine start and prior to takeoff, the respective non-normal checklist must be accomplished if an EICAS Alert message is displayed. Upon completion of the checklist, the MEL must be consulted to determine if dispatch relief is available.
- System controls should be in the normal configuration for the phase of flight before the start of the non-normal checklist.
- Aural alerts should be silenced and the master caution/warning system reset by the flight crew as soon as the cause of the alert is recognized.
- The EMERGENCY position of the oxygen regulator must be used when needed to supply positive oxygen pressure in the masks and smoke goggles to evacuate contaminants. The 100% position of the regulator must be used when positive pressure is not needed, but contamination of flight deck air exists. The NORMAL position of the regulator must be used if prolonged use is needed and the situation allows. Normal boom microphone operation should be restored when oxygen use is no longer required.
- Indicator lights should be tested to verify suspected faults.

NON-NORMAL CHECKLIST PROCEDURES

Any crewmember detecting an emergency or abnormal condition shall immediately identify and verbally communicate the condition to the other crewmember(s).

When a non-normal condition is identified, the PF calls for the appropriate checklist when:

- Flight path is under control.
- Aircraft is not in a critical stage of flight (such as takeoff or landing).
- All Immediate Action items are complete.

In the event the First Officer is PF when a malfunction occurs, decisions regarding which checklist to accomplish and the designation of PF and PM, are subject to final determination by the Captain. The Captain should clearly designate which pilot will be the PF and which pilot will be the PM.

The overriding matter of importance at all times is that **SOMEONE MUST FLY THE AIRCRAFT**. As Pilot-in-Command, the Captain has ultimate responsibility and authority with regard to the safety and operation of the aircraft. The designated PF must devote constant attention to control and navigation of the aircraft with regard to terrain, weather, ATC and aircraft configuration. The PF participates in verification and completion of any checklist only after safety-of-flight is assured.

Execution of any checklist should not commence until the aircraft is at a safe altitude, airspeed and configuration, commensurate with the phase of flight. The minimum altitude after takeoff to initiate a checklist is 1,000 feet AFE, unless the Captain determines that a delay will jeopardize safety. Only a few situations require an immediate response (such as stall warning, GPWS pull-up or windshear warnings or a rejected takeoff). Time is usually available to assess the situation before corrective action is required. All actions should be coordinated with the Captain and performed in a deliberate and systematic manner. Under no circumstances is safety-of-flight to be compromised to accomplish any checklist or procedure.

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