BRITISH AIRWAYS

B747
Three Engine Ferry Manual

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Issued by: Captain David Thomas, Head of Flight Technical & Training, Waterside, LHR, HFB1, British Airways, PO Box 10, Heathrow Airport, Hounslow, Middlesex, TW6 2JA.

Approved Signatory: 

1. This LEP is a complete re-issue showing individual page numbers.

2. Record this revision number on the Record Sheet in the front of this manual.

List of Effective Pages

Page	Rev	Date	Page	Rev	Date	Page	Rev	Date
LEP–1	3	Apr 2018						
LEP–2	3	Apr 2018						
RH–1	3	Apr 2018						
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TOC–1	3	Apr 2018						
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2–6	2	Oct 2015						
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REVISION HIGHLIGHTS – REV 3

Revision	Reason
3	Update to Limitations, Flight preparation requirements, Aide Memoire checklist and clearance examples updated.

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Contents

1 LIMITATIONS

1.1 General

In addition to the normal limits found in the Operations Manuals, the following limitations apply to three engine ferry operations.

1.1.1 Purpose

The aircraft shall only fly for the purpose of reaching a place at which the defective power unit can be rectified or replaced. It shall not be used for public transport or aerial work and will be limited to a maximum of two planned sectors.

1.1.2 Crew

A three engine ferry training programme, including an annual simulator detail, will be established by the Fleet. Successful completion of this training (given by a designated 3EFF pilot, usually a suitably qualified Training Standards Captain) will constitute qualification to perform three engine ferry operations. This training must include incapacitation procedures, specifically the actions of the first officer if the captain becomes incapacitated before or during the initial airborne phase. Three engine ferry simulator details shall remain valid for 12 months from the date of completion. A copy of the TRANCOMM report should be carried by the crew member as proof of his qualification.

The Captain of a three engine ferry flight will always be designated and qualified as above, and will always act as PF for the take off and clean up flight phases. Once the aircraft is clean there is no restriction on PF duties and if Flight Time Limitations are a factor then command can be relinquished to a line BA captain.

BA does not have specifically designated first officers for 3EFF operations. When a 3EFF operation is planned the commander (who will always be qualified and designated) is responsible for briefing and training the first officer in his specific role and responsibilities. The first officer must be “experienced”, which BA interprets as not being a brown line holder.

The crew should be limited to essential operating crew members only, but such operations will often require the use of a relief crew. Any such pilot should be briefed in a similar way to the operating first officer but it should be noted that relief crewmember’s duties are no different from a normal line flight continuation policy in which all BA 747 pilots are trained. This means there are no experience restrictions (brown line) on additional crew members.

The operation is covered by an approved Boeing Aircraft Flight Manual Appendix and is operated by line crew as part of their normal duties. As such, normal BA Insurance Cover is provided.

1.2 Operational Limitations

1.2.1 Maximum Airspeed

Do not exceed 320 KIAS/0.85 M.

1.2.2 Take-off Performance Limit (TOPL) Weight

The TOPL Weight should be requested by using CARD.

1.2.3 Take-off EPR

Derate 2 (TO 2) must be used for take-off. Operation with improved climb performance and/or extended climb performance is not permitted.

1.2.4 Take-off and Landing Configuration

Take-off shall be made using Flap 10.

Antiskid and all brakes must be operative. Landing Configuration shall be made using Flap 25.

1.2.5 Air Conditioning and Pressurisation

Take-off performance is based on Packs Off or one Pack On.

1.2.6 Runway Condition

Take-off is not permitted on contaminated runway (i.e. standing water greater than 3 mm, ice, slush, snow or slippery). The pressure altitude of the departure runway must not be greater than 9500 ft.

1.2.7 Weather Conditions

The visibility and cloud ceiling prevailing at the airport of departure, and forecast for the destination and alternate airports, shall not be less than 3 km and 1,000 ft respectively.

EASA recommends 3 km and 500 ft as forecast minima at destination and alternate airfields, but the over-riding requirement is for the captain to always be able to reach an airfield where a two engine approach and landing can be safely carried out whilst utilizing the minima available for the likely one engine inoperative approach iaw BA flight continuation policy.

1.2.8 Icing Conditions

Areas of predicted or reported icing conditions should be avoided. If icing is encountered a restriction of 270 kt/Mach 0.8 should be adhered to.

1.2.9 Limiting Crosswind Component

For take-off the crosswind component of the tower-reported or forecast wind velocity must not exceed 7 K from the side on which the unserviceable engine is located. The normal crosswind limits for one or two engines inoperative should be observed for landing.

1.2.10 Range from Alternate Airfields

No place along the intended track shall be more than 2 hours flying time (800 nautical miles) in still air at the ferrying cruise speed of 400 knots from a suitable alternate airfield.

1.2.11 Fuel Requirements

Normal BA fuel requirements apply. Three engine ferry CIRRUS flight plans are available.

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2 NORMAL PROCEDURES

2.1 Preparation

Four cowled engines must be installed. Any one engine may be inoperative. The inoperative engine must be in one of the following configurations:

1. Fan Removed – The fan removed in accordance with the 747-400 Maintenance Manual, Chapter 71-00-61, Preparation for Three Engine Ferry Flight (Preferred option).
2. Windmilling – The engine is prepared in accordance with the 747 Maintenance Manual, Chapter 71-00-61, Preparation for Three Engine Ferry Flight.

Note 1: The following remaining equipment must be serviceable:

- Anti-skid and all braking systems (excluding autobrake).
- 3 electrical generator channels.
- 3 bleed air pneumatic systems.
- 4 hydraulic demand pumps.
- All fuel pumps associated with the fuel tanks in use.
- Fuel jettison system.

Note 2: Any equipment deficiencies which have an associated performance penalty must be discussed with Flight Management, e.g. EPR indication.

Note 3: All revenue payload must be removed (non-revenue flight).

Note 4: Docunet and Lido mPilot contents must be reviewed prior to departure from home base, to ensure adequate documentation (charts) for the planned route.

2.2 Planning

Use CARD to obtain provisional TOPL and take-off vital data information for the runways likely to be in use.

Request a three engine ferry CIRRUS flight plan from Flight Technical Dispatch. Confirm on page 1 of the CIRRUS “NON STANDARD OPERATION ENGINE OUT” is shown.

If the TOPL is likely to be restrictive consider offloading all catering equipment and potable water. This can reduce the ZFW by up to 7,000 kg.

For flights within US airspace ensure that an FAA Special Flight Authorisation for a three engine ferry flight will be obtained. Such an authorisation is essential for flights within US airspace. Once received, confirm the expiry date of the Authorisation.

For flights within Canadian airspace ensure that the three engine ferry authorisation is valid.

It is recommended that three engine ferry flights are not dispatched into regions of predicted or reported icing conditions. Whilst this is recommended, there may well be a favourable balance between limited exposure to icing as against having to re-route with a possible extra sector.

2.3 Pre-flight Checks

Perform all normal pre-flight checklists except at the appropriate point:

1. Set MDA display to the second engine failure acceleration altitude.
2. Set planned acceleration altitude in the E/O acceleration altitude field on the Take-off page.
3. Do not select ENG OUT prompt on the FMS VNAV CLB or CRZ pages.
4. Select TO 2 (Derate 2 take-off thrust) and CLB (full climb thrust).
5. Select Flap 10.
6. LNAV may be used.
7. VNAV may be used.
8. Select Autothrottle Off.
9. Carry out packs off or one pack on take-off procedure.
10. Place the ground proximity GEAR OVERRIDE switch to OVRD.

2.4 Taxiing

The Transponder should be selected to TA only.

In the event of a long taxi maintain fuel symmetry by selective use of cross-feed valves and booster pumps and ensure the correct configuration is established before take-off.

2.5 Take-off

Aircraft handling during take-off differs significantly from the normal procedures. Care is necessary to ensure that directional control is maintained during the take-off roll yet it is also important that take-off thrust is set on the asymmetric engine expeditiously. The aim is that take-off EPR will be set on the symmetrical engines with the aircraft stationary. Brakes are then released and thrust is progressively increased on the asymmetric engine during the take-off run at a rate which is commensurate with directional control being retained.

2.6 Take-off Technique

1. Do not preset the rudder trim.
2. Align the aircraft with the runway centre line and apply foot brakes. Press TOGA to update the ND if GPS is unserviceable.
3. The **Co-pilot** will:
    a. Hold the control column forward applying necessary aileron inputs for crosswind. Note that at higher speeds the nose will naturally want to lift and this should be resisted.
    b. Call out EPR and speeds in 20 KIAS intervals, recommended commencing at 40 KIAS. Note that power should not be increased on the assymetric engine below 50 kts.
    c. When flaps are up set CON thrust on the FMC Thrust Lim page.
4. The **Captain** will:
    a. Set take-off thrust on the symmetric engines and advance the ‘dead’ engine thrust lever.
    b. Release the brakes and apply 1.03 EPR on the remaining operating engine.
    c. As the aircraft accelerates, the Captain simultaneously advances the operable engine’s thrust lever (not below 50 KIAS) and maintains directional control using the tiller and rudder pedals. It is recommended that steering inputs be made primarily using the rudder fine steering. The tiller should be guarded and only used with extreme caution in the event of insufficient control from the rudder pedals.
    d. Steadily increase thrust on the asymmetric engine to attain take-off thrust at a speed near to, but not below V_{MCG}.

e. After the operable engine attains take-off thrust, the Captain takes the control column and completes the take-off and climb out using normal procedures appropriate to three engine climb out.

f. The Flight Director will command V_2 - V_2 + 10 KIAS during the climb out. With VNAV engaged at Aa an increase in speed will be commanded. If VNAV not engaged at Aa, select FLCH and an increase in speed to V_{REF} + 100 K. When flaps are up, arm autothrottle and check/select THR to CON thrust. Select and execute ENG OUT on the CDU CLB page.

g. When flaps are up select all packs on.

h. Maintain fuel symmetry using cross-feed valves and fuel pumps switches as required.

i. Return the ground proximity GEAR OVERRIDE switch to normal.

Note 1: RTO autobrakes are not available when any thrust lever is not advanced however, BA procedures recommend the “dead engine” thrust lever is advanced.

Note 2: Do not follow any noise abatement procedure that restricts airspeed.

Note 3: Retract gear and flaps as soon as possible.

One Inboard Engine Inoperative

Use the same procedure as for take-off with an outboard engine inoperative except that take-off thrust is initially applied on the outboard engine. Increase thrust on the operating inboard engine so that take-off thrust is obtained at 80 to 90 KIAS.

2.7 Climb and Cruise

1. En-route climb is carried out at the FMC ENG OUT SPD using maximum continuous thrust (CON).
2. Cruise is carried out at ENG OUT LRC (long range cruise) speed. Do not enter speeds which exceed 320 KIAS or 0.85 M.
3. Three engine performance data is contained in the FMC.

2.8 Approach and Landing

Carry out the approach and landing in accordance with standard one engine inoperative procedures.

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3 EMERGENCY PROCEDURES

In addition to the normal and emergency procedures found in the Operations Manuals, the following emergency procedures apply to three engine ferry operations.

3.1 Take-off

In the event of an engine failure prior to VSTOP, reject the take-off.

When using CARD for performance calculations VSTOP can be considered equal to V_1.

If during the take-off an engine failure occurs on the same side as the inoperative engine then full rudder deflection may be required in order to keep the aircraft straight. At V_R, the HP will rotate the aircraft at approximately 2° per second, to a target attitude of about 11°. Once airborne up to 3° of bank towards the live engines is permitted to assist in keeping straight. For any combination of two inoperative engines, initial climb out should be made at V_2 and the acceleration should be made, level, at the minimum clean up height as calculated, which will never be less than 400 ft but which may be higher if obstacles are present (see Chapter 4).

In the event of the Captain becoming incapacitated during the take-off run, the First Officer will take control. His/her subsequent action will be as follows:

Prior to Vstop, the take-off should be rejected. Subsequent to rotate the take-off should be continued with the first officer ready to take rudder load as part of assuming control. If a subsequent engine failure occurs, he/she will then make an appropriate decision based on the factors mentioned above.

3.2 Cruise

In the event of an engine failure occurring in the cruise, divert to the nearest suitable airfield. Recheck the MSAs en route and re-confirm the drift down altitude and range performance. The FMS will give two engines inoperative data in this condition. Quick reference drift down altitudes for both one and two engines inoperative are in the QRH.

3.3 Two-engined Landing

Following an engine failure the subsequent two-engined landing should be performed in accordance with standard two engine inoperative procedures.

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4 PERFORMANCE

4.1 CIRRUS

The CIRRUS flight plans are based on a windmilling engine. This is the same as the FMS performance for ENG OUT.

4.2 Take-off Performance Limit (TOPL) Weight

Use CARD to obtain the TOPL weight and take-off speeds using performance correction code 87.

If CARD is not available use SATCOM, ACARS, SITA or telephone FTD on 44 208 51 (30455 or 30454 or 30672) to run CARD.

The aeroplane may require defuelling.

The three engine ferry take-off performance data is based on:

- Flap 10.
- Minimum acceleration altitude of 400 ft (CARD will show the engine-out acceleration altitude if higher than 400 ft).
- Ignore any Noise Abatement procedure if shown on CARD.
- Take-off Derate 2 (TO2).
- Packs off or one pack on.

4.3 Take-off Speeds

CARD will output the Maximum Stopping speed VSTOP (V_1), V_R and V_2 for actual take-off weight.

CARD will adjust VSTOP to equal V_R if required.

4.4 Take-off EPR

Use TO2 (Derate 2 take-off thrust).

4.5 Landing Performance

The Maximum Performance Landing Weight is the lesser of the Field Length Limit Weight and Climb Limit Weight. Do not exceed Maximum Structural Landing Weight.

4.5.1 Field Length Limit Weight

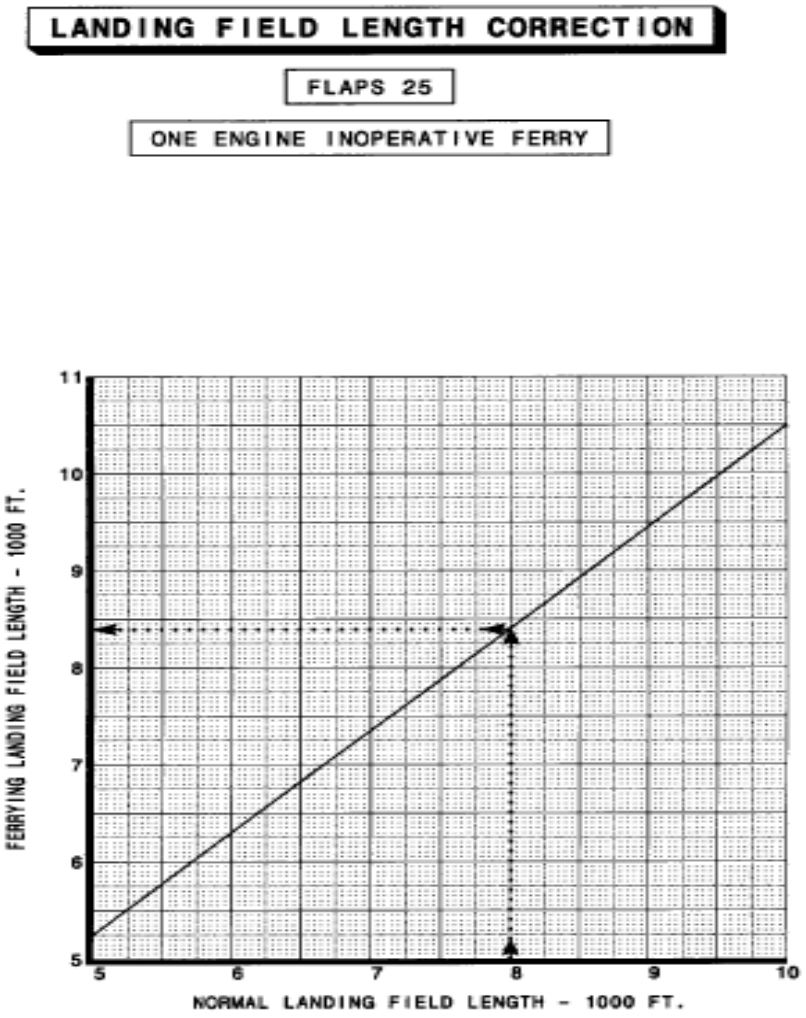
1. On the LANDING FIELD LENGTH CORRECTION chart enter the Ferrying Landing Distance scale with Landing Distance Available and read the Normal Landing Distance.

2. On the MAXIMUM LANDING WEIGHT (FIELD LENGTH LIMITS) chart enter the Landing Field Length scale with the Normal Landing Distance obtained in 1, adjusting for wind and proceed to Airport Pressure Altitude and read the Gross Weight.

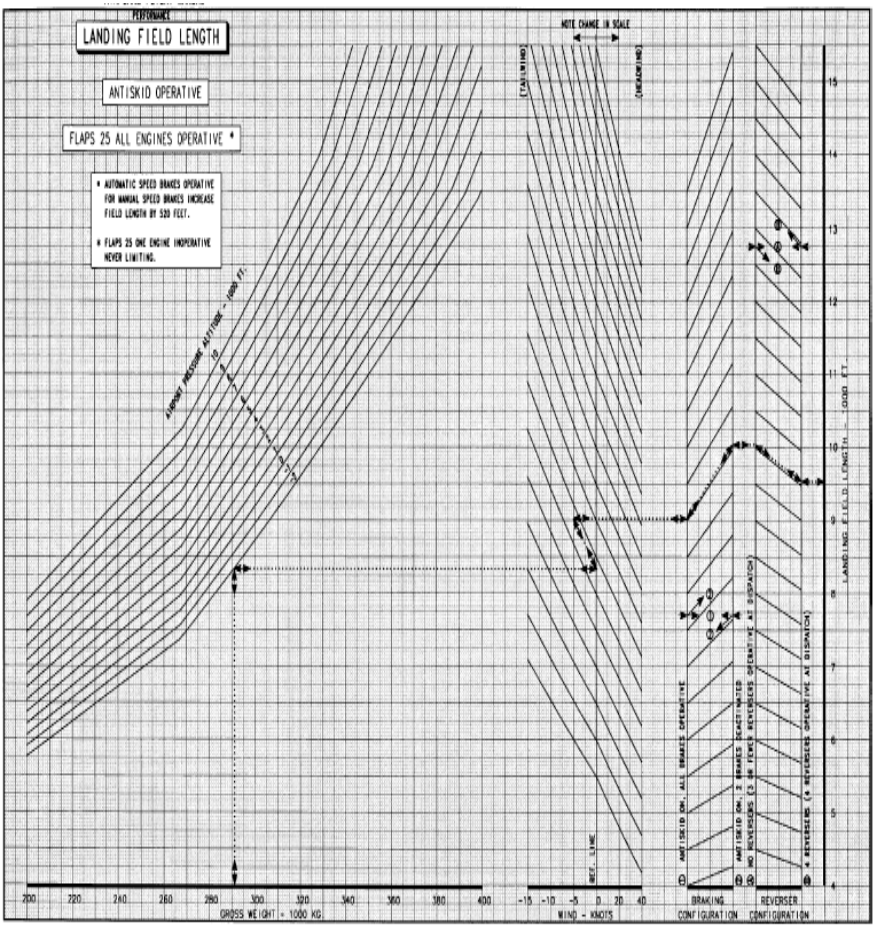
4.5.2 Climb Limit Weight

On the MAXIMUM LANDING WEIGHT (CLIMB LIMITS) chart enter the Airport OAT scale to the Pressure Altitude and read the Gross Weight.

4.5.2.1 Maximum Landing Weight (Landing Field Length Correction)



4.5.2.2 Maximum Landing Weight (Field Length Limits)



4.5.2.3 Maximum Landing Weight (Climb Limits)

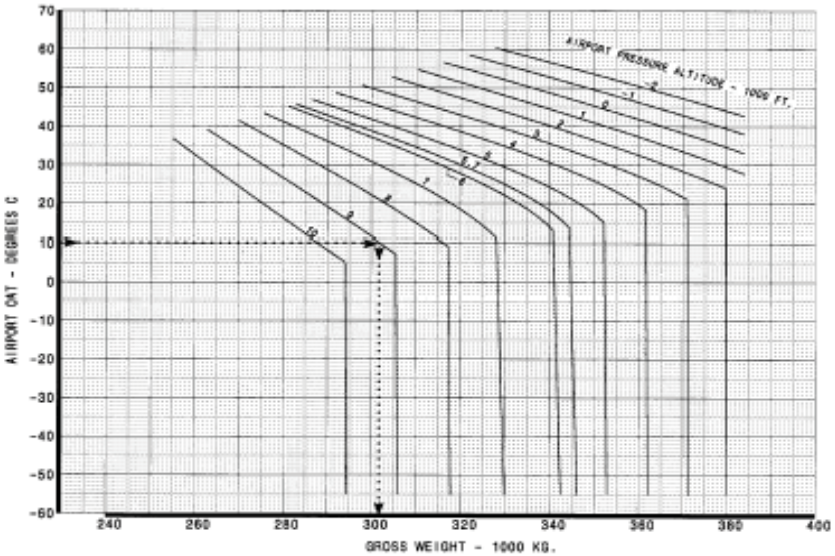
MAXIMUM LANDING WEIGHT
CLIMB LIMITS

LANDING FLAPS 25

A/C PACKS OFF

ONE ENGINE INOPERATIVE FERRY

- FOR SPEED SCHEDULE SEE THE APPROPRIATE LANDING CLIMB CHART ON THE BASIC MANUAL
- FOR 1 A/C PACK ON, REDUCE GROSS WEIGHT BY 4500 KG.



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5 MISCELLANEOUS

5.1 Handover Brief

5.1.1 Introduction

Line crews may be tasked with completing the remainder of a three engine ferry flight after the take-off and climb phases have been completed. The cruise, approach and landing phases of the flight should be completed in accordance with normal Company procedures with a few differences as detailed. These handover notes are intended to assist crews by pointing out the differences and by offering guidance where necessary.

5.1.2 Limitations

The only additional limitation applicable to a three engine ferry flight is the maximum speed limitation which is caused by the fact that the inoperative engine creates more drag:

Maximum Airspeed – Do not exceed: 320 K/0.85 M

Icing conditions should be avoided but if they are inadvertently encountered limit speed to 270 kt/Mach 0.8

5.1.3 Cruise

The CIRRUS flight plan and FMS use the same three engine database, which assumes a windmilling engine. Normally for a three engine ferry the fan blades of the inoperative engine have been removed and the core of the engine has been aerodynamically blanked. This produces less drag than the windmilling engine case, and so the fuel predictions will be pessimistic. The fan blades are usually carried on board and their weight is included in the Dry Operating Weight.

Once at cruise altitude fly at the FMS E/O LRC speed. This will require selection of LRC on the ACT E/O CRZ page (E/O speed is much slower and is the optimum three engine drift down speed at minimum rate of descent). CIRRUS three engine cruise speeds are also based upon E/O LRC.

Ensure that at all stages of flight the aircraft has sufficient range and altitude capability to reach a suitable airfield should a second engine fail.

Maintain fuel symmetry through selective use of cross-feeds valves and fuel pumps in accordance with FCOM Supplementary Procedure – Fuel and FCTM Chapter 8, Fuel Guidance.

5.1.4 Descent and Landing Procedures

The descent and landing phases are conducted in accordance with normal three engine procedures. The AUW will probably be much lower than you have experienced before. The V_{REF} will be comparatively low and the EPR required will be lower than usual. A common error is to float when landing at these light weights. As this is a non-revenue flight and as an emergency condition does not exist, the Captain may, at his discretion, permit the Co-pilot to land the aircraft.

5.2 Transport Canada Clearance for Three Engine Ferries

See Transport Canada CARs Part V, Standard 507 - Flight Authority & Certificate of Noise Compliance (507.04 Paras (3) & (4)) for flight permit application process, and Chapter 505 Schedule B Operating Conditions and Limitations for One Engine Out Ferry Flight and for Prohibited Runways listing.

Transport Canada Transports Canada Canada

Part V - Chapter 505 Schedule B, Annex 1 - Prohibited Runways

Canadian Aviation Regulations (CARS) 2015-1

Content last revised: 2009/12/01

Takeoff is prohibited from the following Canadian airport runways, for the purpose of a ferry-flight with one engine inoperative:

Airport	Airport Code	Prohibited Runway
Calgary	CYYC	16
Edmonton Municipal	CYXD	All runways
Kamloops	CYKA	08
Penticton	CYYF	34
Regina	CYQR	07
Saskatoon	CYXE	14
Vancouver	CYVR	08, 12
Victoria	CYYJ	02, 08, 13, 20, 31
Winnipeg	CYWG	07, 13, 18
Charlottetown	CYYG	21
Fredericton	CYFC	15
Halifax/Shearwater	CYAW	29, 34
Hamilton	CYHM	06
London	CYXU	26
Moncton	CYQM	29
Montréal/Dorval	CYUL	All runways
Montréal/ St. Hubert	CYHU	24, 28
Ottawa	CYOW	32
Quebec City	CYQB	12
St. Catharines	CYSN	24
Sydney, N.S.	CYQY	07
Thunder Bay	CYQT	07
Toronto - Pearson International	CYYZ	06 Right, 15
Val d'Or	CYVO	36
Windsor	CYQG	25

Link to Transport Canada:

http://www.tc.gc.ca/eng/civilaviation/regserv/cars/part5-standards-505-sub-g-264.htm#scheduleb

5.3 Example FAA, Canadian and UK CAA Clearances for Three Engine Ferries

U.S. Department of Transportation
Federal Aviation Administration

Scottsdale Flight Standards District Office
Western Pacific Region

17777 N. Perimeter Dr., Ste. 101
Scottsdale, AZ 85255
Phone: (480) 419-0330
Fax: (480) 419-0800,

FOREIGN CIVIL AIRCRAFT SPECIAL FLIGHT AUTHORIZATION (SFA)

Authorization No.:	WP-07-57A
Aircraft Make:	Boeing
Aircraft Model:	B747-436
Serial No.:	28700
Nationality and Registration Marks:	British, G-CIVM
Name and address of Registered Owner:	British Airways PLC Waterside (HAA3) PO Box 365, HARMONDSWORTH WEST DRAYTON UB7 0GB

Pursuant to the Code of Federal Regulations (14 CFR) § 91.715, British Airways is hereby authorized to operate the aircraft identified above for the purpose of flying from KPHX to LHR via L.F. Wade International Airport (IATA: BDA, ICAO: TXKF). This aircraft is on British registry and an airworthiness certificate is not valid due to the #3 engine being inoperative. All operations must be per the following restrictions and limitations.

1. A copy of this authorization must be available to the pilot in command when operating under the terms of this SFA.

2. You must comply with all limitations imposed by the State of Registry and this authorization.

3. Persons or property must not be carried for compensation or hire.

4. This authorization is valid in the United States only.

5. Upon request, this authorization must be made available to an FAA inspector.

6. This SFA is valid until December 17, 2017, unless superseded or rescinded.

Leon L. Kelley
ASI Scottsdale FSDO

Date issued: December 11, 2017

SFA # WP-07-57A G-CIVM December 11, 2017

Transport Canada / Transports Canada

Your file Votre référence

Our file Notre référence

5812-5-7U RDIMS 11402179v1

December 11, 2015

British Airways Maintenance Control
Waterside HFA3, PO Box 365, Harmondsworth
Middlesex, UB7 0GB, UK

Via email: simon.maddison@ba.com

Subject: Canadian Validation of the Permit to Fly issued to Boeing 747-436 aircraft, MSN 25812, Registration G-CIVC dated 11 December, 2015.

Dear Sir,

Pursuant to Canadian Aviation Regulation (CAR) 507.05, this letter constitutes a validation by Transport Canada of the Permit to Fly issued to **Boeing 747-436 aircraft, MSN 25812, Registration G-CIVC dated December 11, 2015,** to fly in Canadian airspace with technical landings as required. The validation is subject to the following conditions:

1. Continued compliance with the Conditions/Restrictions, which form part of the Permit to Fly dated **December 11, 2015**, issued by the Civil Aviation Authority of the United Kingdom;
2. A copy of this validation shall be carried on board the aircraft;
3. Transport of passengers are not permitted and only essential flight crew members shall be carried on board;
4. Flight over built-up areas is prohibited except during take-off and landing;
5. **Prohibited runways identified in Annex 1 to Schedule B of Canadian Aviation Regulation part V – Airworthiness Manual Chapter 505 *shall not be used*;**
6. The Canadian Aviation Regulations (CARs) shall be complied with while the aircraft is in Canadian airspace;
7. This validation does not apply to any Test Flight to be conducted in Canadian airspace;
8. The aircraft shall be operated by licensed pilots holding appropriate certificates or licences, issued or validated by Canada or the country of registry of the aircraft.

This validation is in effect from **December 11, 2015 expiring December 22, 2015.**

For the Minister of Transport,

Steve Ragnauth TCR 190

Steve Ragnauth
Civil Aviation Safety Inspector – Airworthiness (416-919-4545)
Foreign Operations Division, Transport Canada

Canada

Certificate No:

TE046933/997/002

PERMIT TO FLY

Civil Aviation Authority

This Permit to Fly is issued pursuant to Regulation (EC) 216/2008 Article 5(4)(a), and certifies that the aircraft is capable of safe flight for the purpose and within the conditions listed below and is valid in all member states. This permit is also valid for flight to and within non member states provided separate approval is obtained from the competent authorities of such states.	1. Nationality and Registration Marks **G-CIVM**
2. Manufacturer and designation of aircraft **BOEING COMPANY** **BOEING 747-436**	3. Aircraft Serial Number **28700**
4. The permit covers **One ferry flight only from Phoenix Sky Harbor International Airport (KPHX), USA to London Heathrow Airport (EGLL), United Kingdom for the purpose of positioning the aircraft for maintenance, including any associated technical stops.**	
5. Holder: **The Registered Owner**	
6. Conditions/Remarks: **This permit is subject to the conditions listed on the attached page(s)**	
7. Validity Period: **7 December 2017 to 19 December 2017**	
8. Place and Date of Issue: **Aviation House Gatwick 07 December 2017**	9. Signature for the Civil Aviation Authority

EASA Form 20a (Non-design related) 16122013

Civil Aviation Authority

Conditions of EASA Permit to Fly Number TE046933/997/002
Dated: 07 December 2017

Registration Mark: **G-CIVM**

Manufacturer of aircraft: **BOEING COMPANY**

Designation of aircraft: **BOEING 747-436**

The aircraft must be operated in accordance with the following conditions or restrictions.

1. The aircraft must be operated in accordance with the Conditions/Restrictions as listed in **CAA approved flight conditions dated 07 December 2017, referenced G-CIVM/997/07122017.**

2. **Prior to flight**, a Certificate of Release to Service (CRS) shall be issued verifying the aircraft conforms with the conditions specified on the Permit to Fly, the CAA approved flight conditions and any associated documents, and that the aircraft has been inspected and is fit for the intended flight.

Above flight conditions approved under CAA reference: G-CIVM/997/07122017

CIVIL AVIATION AUTHORITY 193

For the Civil Aviation Authority

ANNEX A: AIDE MEMOIRE

LIMITATIONS
CREW……..CPT MUST BE QUALIFIED
BRIEF…. NON- QUALIFIED FLIGHT CREW
……..NO PAX / FREIGHT OR CABIN CREW
SPEED ….320KIAS / 0.85M (WINDMILLING)
MTOW……..……..PERFORMANCE LIMIT
TAKE OFF EPR……TO2
TAKE OFF FLAP……..……..10˚
TAKE OFF BLEEDS...……PACKS OFF or 1 PACK ON
RUNWAY…… NOT SLIPPERY or CONTAMINATED
WEATHER……..……..>3km / 1,000ft
X WIND……..7K FROM "DEAD SIDE"
ICING CONDITIONS…AVOID IF POSSIBLE
FUEL REQUIREMENTS……...NORMAL
USA……FAA SPECIAL AUTHORISATION (Ad Hoc)
CANADA…….. SPECIAL AUTHORISATION (Adhoc)

Complete all Normal checklist items in the usual sequence. + **POSITIONING FERRY FLIGHT ITEMS** [FCOM SP]
Items noted below are additional or modify the normal items.

PRE -FLIGHT
FMC –VNAV……..……..……..ALL ENG
THRUST……TO2
CLIMB THRUST……..…..CLB
A/T……..OFF
A/C PACKS……..…….…… . OFF or 1 PACK ON
TCAS……...TA Only
GEAR OVERRIDE……OVRD

Charts : have charts available for immediate re-landing
QRH : One open @ 2 Engine checklist & procedure
RAD / NAV: Pre-select return aids, if possible.
Visually examine any potential obstacles in the take-off path and discuss strategy for immediate return.

Clean Up Height (3 Eng)……?
Clean Up Height (2 Eng) (min 400ft)……?

TAKE -OFF
Advise ATC of exact intentions if further engine failure on take–off.
Captain:
RUDDER TRIM……..ZERO
FOOTBRAKES……..APPLY
TOGA ……..……..PRESS TO UPDATE POSN (if GPS inop)
TILLER……GUARD
SYMMETRICAL+DEAD ENGINES...SET TO2
BRAKES ……..RELEASE
ASYMMETRIC ENGINE…….…SET 1.03 EPR
POWER…..……PROGRESSIVELY INCREASE
CALL……I HAVE CONTROL when POWER SET or V1
Co-Pilot:
CONTROL WHEEL ..……HOLD FORWARD
AILERON ……..APPLY AS REQ.
CALL IAS & EPR……EVERY 20KIAS
CALL……..……..……..POWER SET
CALL……V1 ROTATE

AFTER TAKE -OFF
AFTER FLAP UP……..……..SET CON PWR
A/C PACKS……ON
FMC……..SELECT VNAV.ENG OUT
A/T……ARM/ENGAGE
SPEED……..AS REQ.
FUEL……BALANCE
GEAR OVERRIDE……...Normal

CRUISE
FUEL……..……..…… ……BALANCE (see FM SPs)
……Consider FUEL XFER MAIN 1 & 4
UPDATE……2 ENG. DATA
REVIEW……..ENROUTE SITUATION

DESCENT / APPROACH / LANDING
NORMAL

AIRCRAFT SERVICEABILITY

The following must be serviceable:

a) All brake systems on all main wheels (Excluding Autobrake)
b) 3 Main Engine Electrical Generators
c) 3 Bleed Air Pneumatic Systems
d) 4 Hydraulic Demand Pumps
e) No hydraulic leaks
f) All tank Pumps for Tanks with Fuel
g) Fuel Jettison System
h) Door 2L + 1 Upper deck door / slide
i) Any equipment deficiencies which have an associated performance penalty have been discussed with Flight Management e.g. EPR indication

AIRCRAFT PREPARATION

j) Live Engines certified by Powerplant Engineering. (Boroscope Alleviation)
k) Dead engine prepared as Fan Removed or Wind milling.
l) Library Contents Sufficient for the Route

m) All revenue payload removed.

PERFORMANCE:
CARD Input……..

PERFORMANCE – WEIGHT REDUCTION
(Only if performance is critical)

GALLEY EQUIPMENT……..?
POTABLE WATER……?
TOILET TANKS……?
FAN BLADES……?

FLIGHT PLANNING

CIRRUS: Confirm "NON STANDARD OPERATION ENGINE OUT" is shown on Page 1. CIRRUS based on LRC speeds same as FMC with one engine inoperative.

CROSSWINDS
Wind speeds > 65K Shaded

Comp→ / Angle↓	7 Max	15 Wind	25 Speed	30
10°	40	86	>100	>100
20°	20	43	73	88
30°	14	30	50	60
40°	11	23	38	47
50°	9	19	32	39
60°	8	17	28	35
70°	7	16	26	32
80°	7	15	25	30
90°	7	15	25	30

VMCG (TO2)

OAT ˚C

P.A	-55	10	15	20	25
-2000	114	113	113	113	113
0	111	111	111	111	111
2000	108	108	108	108	108
4000	105	105	105	104	104
6000	102	102	101	101	100
8000	97	97	97	97	98
10000	94	94	94	94	93

OAT ˚C

P.A	30	35	40	45	50
-2000	113	113	111	108	106
0	111	109	107	105	103
2000	107	106	104	101	99
4000	103	102	100	97	
6000	100	98	96		
8000	96	95	93		
10000	93	91			

Note:
Operations Planning –A/C & Slots (+00 44 208) 30553
Maintrol……..30881
Maintrol Fax ……..30855
Flight Tech Support……..……31490/1/4
Current Ops / crew contacts……30744
Flight Technical Dispatch ……..30455

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