

 **Airbus Industrie**

A310-300

Performance analysis

INTERFLUG

**A310-300
Performance analysis
for
INTERFLUG**





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Introduction

The Airbus Industrie A310-300 is a twin-aisle, twin-engined, medium/long range aircraft offering **Interflug**

- more advanced technology
- increased passenger comfort
- better freight flexibility
- superior maintainability
- lower operating cost

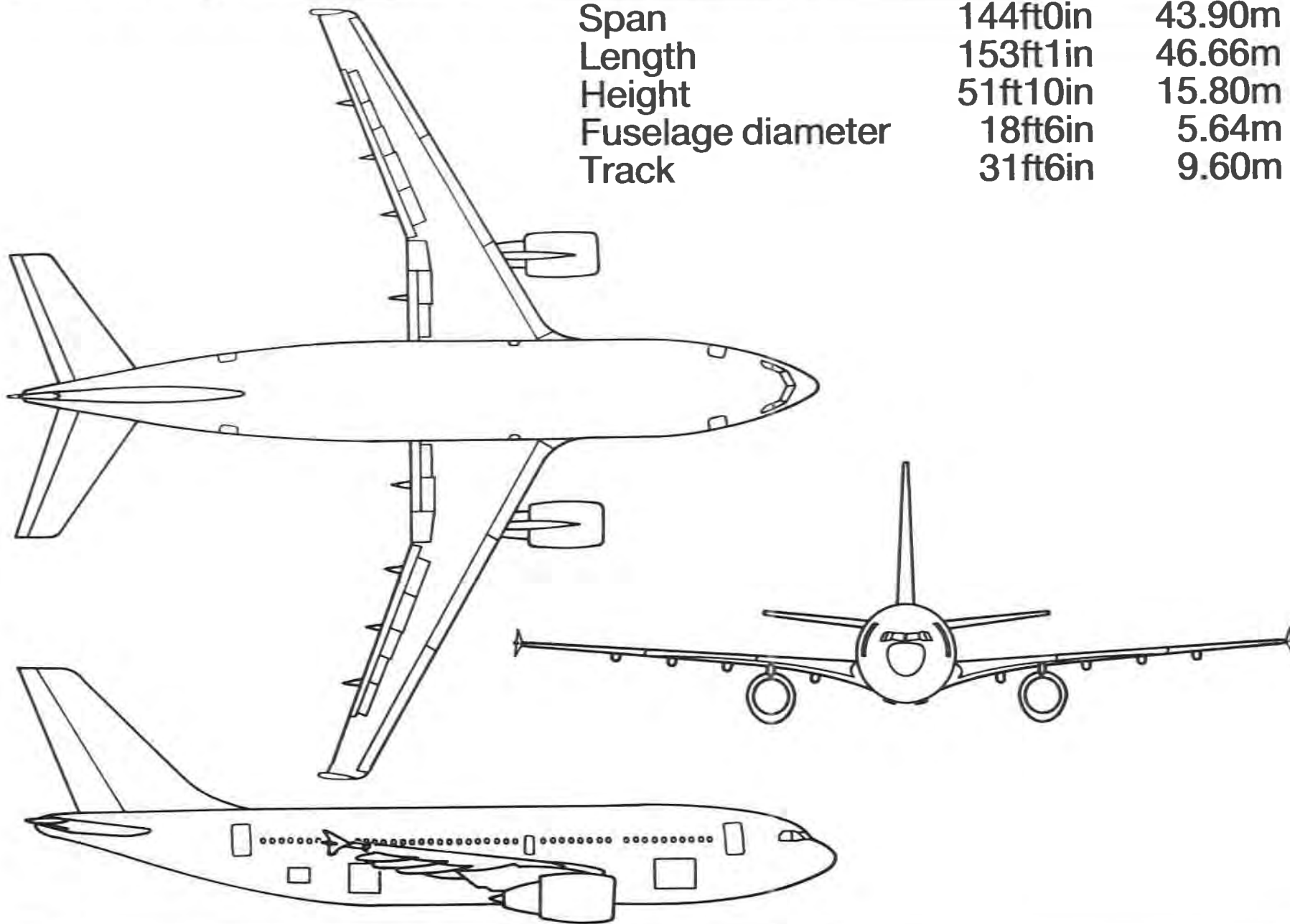
than any other aircraft in its category.

This analysis illustrates the major features of the A310-300 and its performance capability on the most critical **Interflug** routes.

Part 1 : A310-300 general features

A310 general arrangement

Span	144ft0in	43.90m
Length	153ft1in	46.66m
Height	51ft10in	15.80m
Fuselage diameter	18ft6in	5.64m
Track	31ft6in	9.60m



A310 basic data

	A310-300	
Maximum take-off weight - standard - options	150.0t / 330,700 lb 153.0t / 337,300 lb 157.0t / 346,100 lb	
Maximum landing weight - standard - option	123.0t / 271,200 lb 124.0t / 273,400 lb	
Maximum zero-fuel weight - standard - option	113.0t / 249,100 lb 114.0t / 251,300 lb	
Maximum fuel capacity - standard - option*	61,070 l / 16,130 USg 68,270 l / 18,030 USg	
Operating weight empty (typical)	79.6 t / 175,600 lb	
Seats : - typical 2-class - maximum	218 280	
Underfloor cargo	14 / 15 LD3 or 3 pallets + 6 / 7 LD3 + bulk 610 ft ³ / 303 ft ³ (17.3 m ³ / 8.6 m ³)	
Powerplants	GE CF6-80C2 series } 52,000 lb to 53,500 lb P&W PW4152 series } s.l.s.t.	

* Optional fuel tank in aft cargo hold 7200 l / 1900 USg

The 222-inch Airbus fuselage...

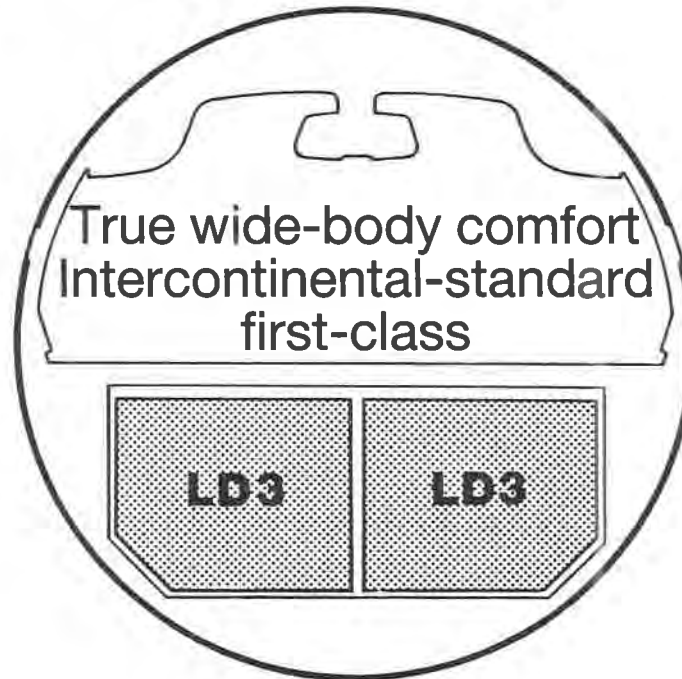
... a unique marketing advantage

707 / 727 / 737 / 757



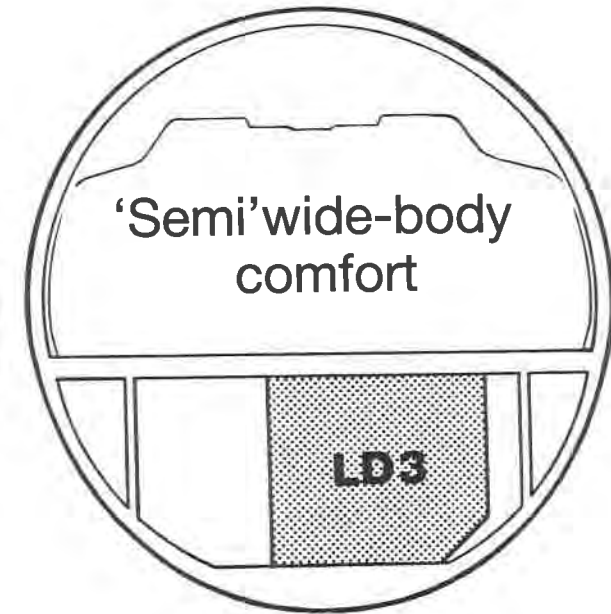
No standard cargo containers / pallets

Airbus twin-aisle



Universal standard cargo load devices

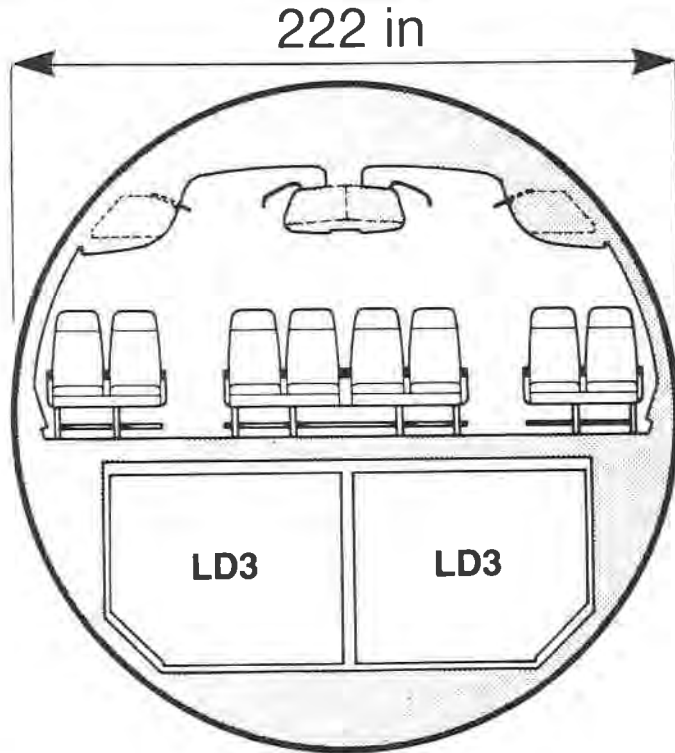
767



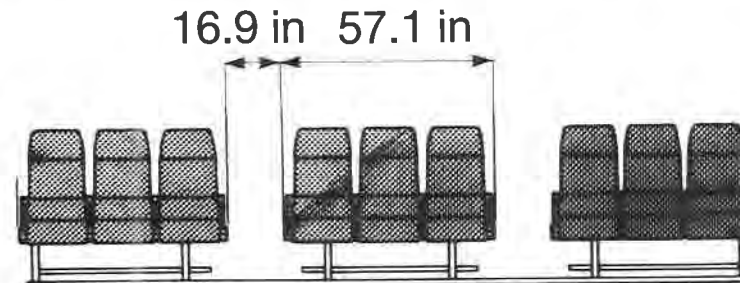
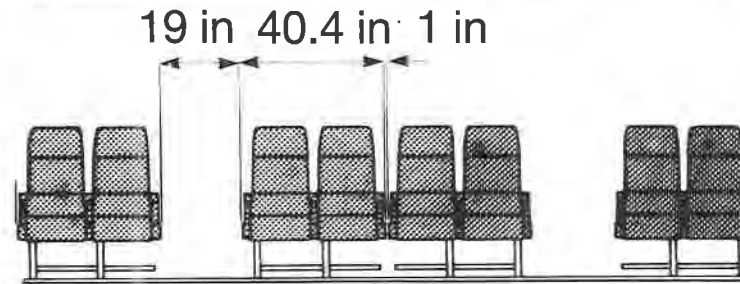
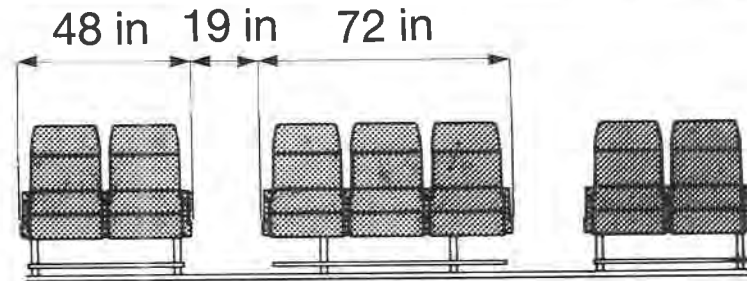
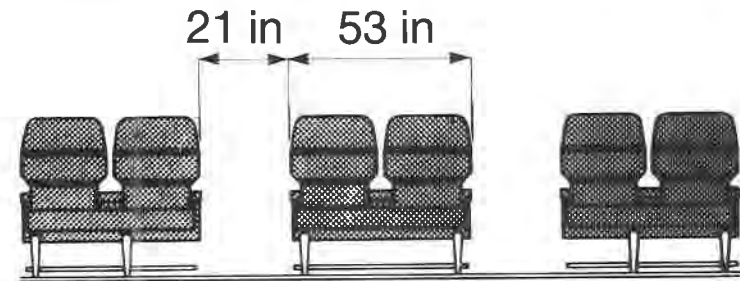
Designed for non-standard cargo containers

⊙ The unique Airbus wide-body cross-section

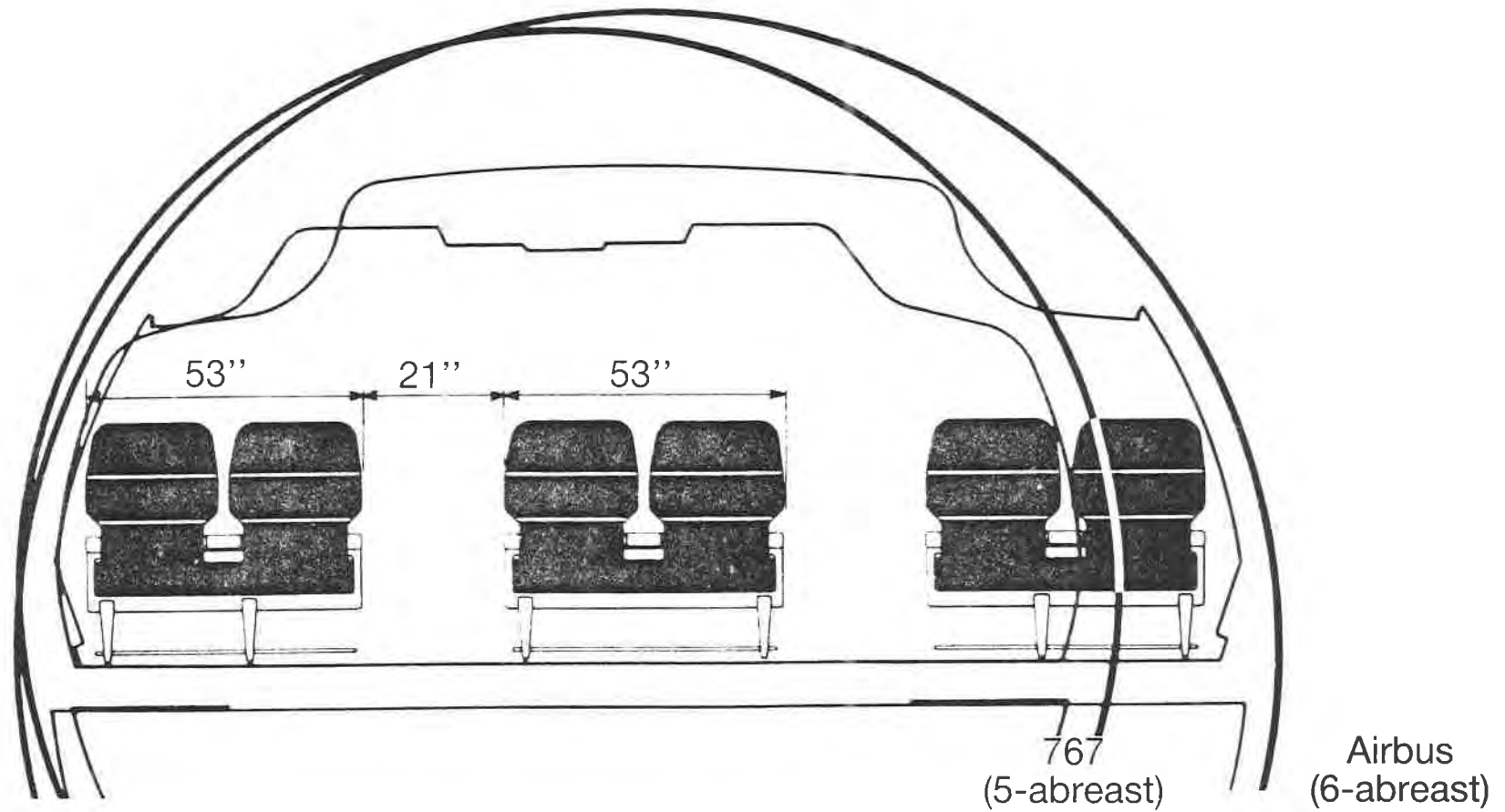
True wide-body spaciousness



Efficient carriage of universal standard containers



 **First class that merits the title**



Airbus 6-abreast standards are accepted worldwide

A310 cargo capability

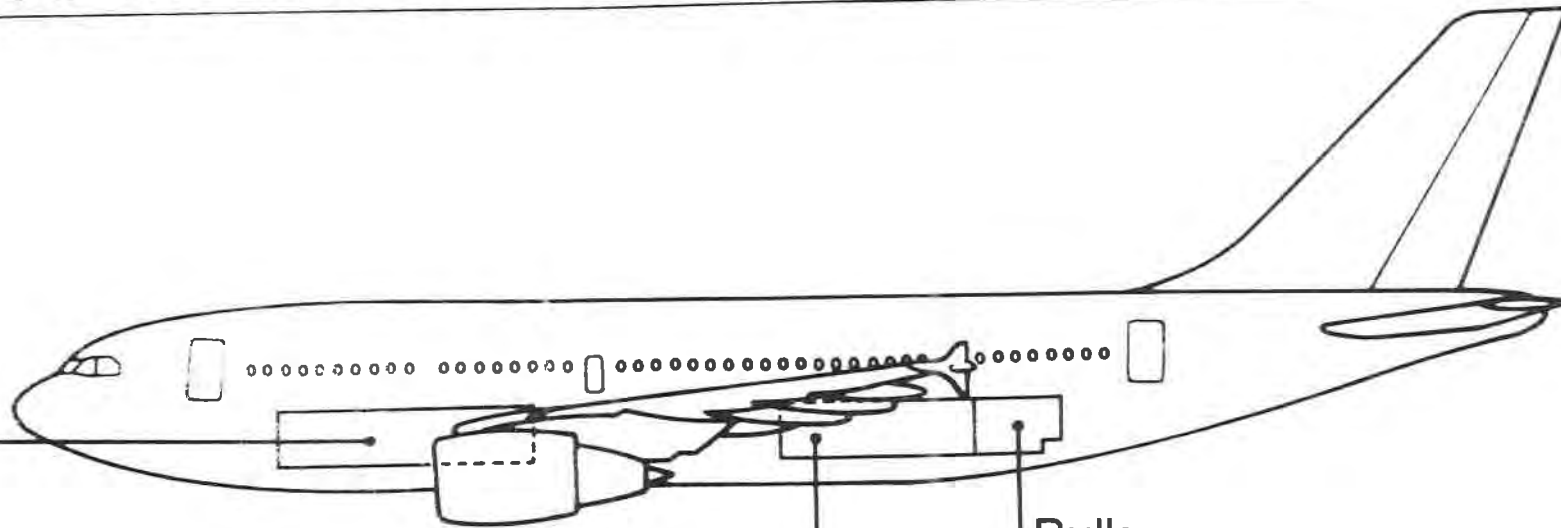
Airbus Industrie, with its unique experience gained from over thirteen years of A300 operation worldwide, fully recognises the importance of underfloor cargo for operators. The underfloor holds of the A310 are designed to be totally compatible with the existing worldwide cargo handling infrastructure.

The A310 can accept all the standard unit load devices in current use, efficiently, using standard ground equipment.

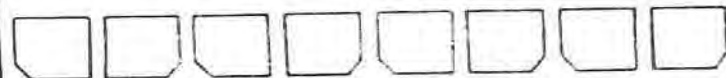
The reliable, semi-automatic, cargo loading system has been designed so that each ULD is locked separately and independently. This increases the versatility of the holds since it allows unrestricted mixes of different containers and pallets.

For the operator with an even greater requirement for cargo capacity, convertible and dedicated freighter versions are available with a large upper deck door.

A310 underfloor cargo



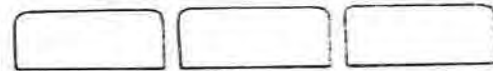
Bulk
610 ft³ (17.3 m³)



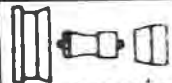
Eight LD3 containers



or three 88 in x 125 in pallet



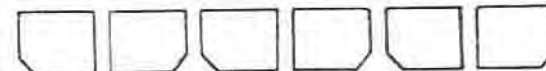
or three 96 in x 125 in pallets*



or engine modules



or four LD6 containers



Six LD3 containers



or three LD6 containers



option : seven LD3 containers
+bulk cargo 303 ft³ (8.6 m³)

*Option

31.B.5002

Underfloor container capability

Container or pallet type	Other aircraft applications	Number of unit positions	
		A310	767-200
LD3	747, DC-10 L-1011, A300	15*	11
LD6	as above	7	?
LD11, LD5, LD10 125 x 60.4 in. pallet	as above	7	3***
LD7, LD9 125 x 88 in pallet	747, DC-10**, L-1011** A300, 707F, DC-8F...	3	3***
125 x 96 in pallet	747, A300	3	3***

* 15th position is optional

** DC-10 and L-1011 need 104 in door

*** Sideways loading requires new ramp equipment

A310 maintenance

Maintainability is built into the A310. The wide fuselage provides easy access to systems and detail design aids the trouble-shooting and maintenance process.

Airbus Industrie's unique experience and continual development of its twin-engine, wide-body aircraft family ensures decreasing maintenance costs. Maintenance procedures developed for the A300 and A310 apply directly to the current A310-200 and A310-300.

The latest A310s enter service benefitting directly from over 13 years of A300 family development and 4 years of experience with the current model A310.

A310 maintainability

- Wide fuselage provides good accessibility

- Simple overhead stowages.
No PSUs in passenger seats

- Maintenance panel for trouble-shooting

- All AFS LRUs have BITE facilities ; testing performed at maintenance panel



- Provisions for hoisting all components over 50 lb

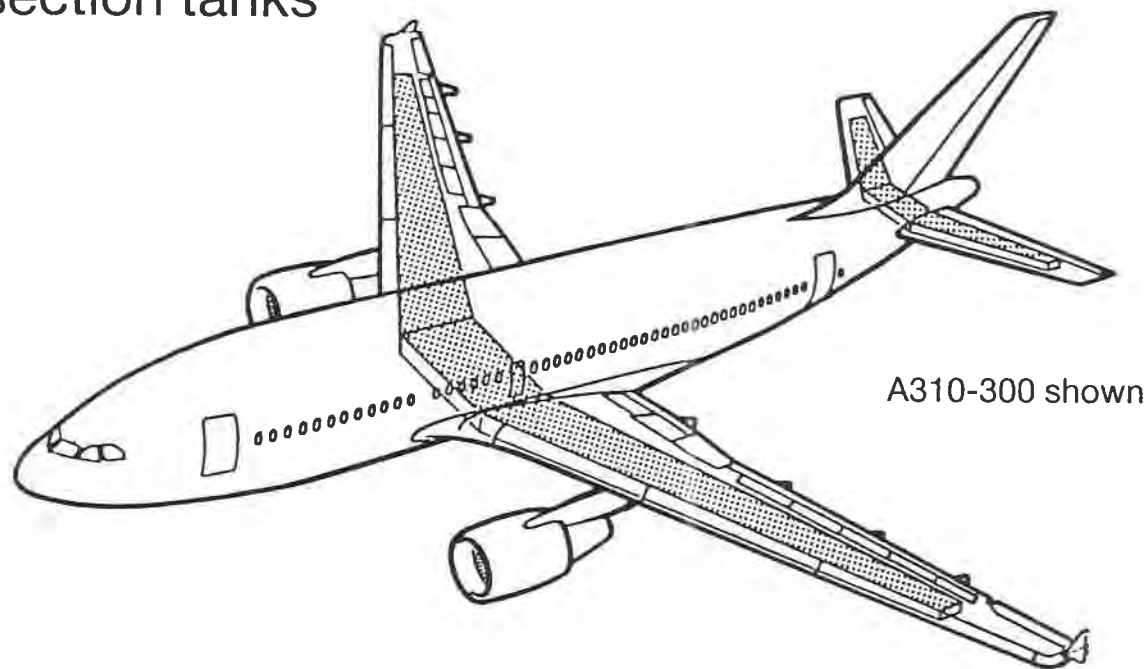
- One main avionics bay.
Access to bay does not disturb galley / passenger handling

- Batteries in single location

A310 design features bring easier maintenance

⑧ The trim tank system - more fuel, less drag

Both the A300-600R and A310-300 have a 6160 lit (1630 USg) fuel tank in the horizontal tailplane in addition to wing and centre section tanks



- The benefits are :
- increased range capability
 - active c.g. management
 - typically 1,5% reduction in cruise drag

Part 2 : A310-300 performance

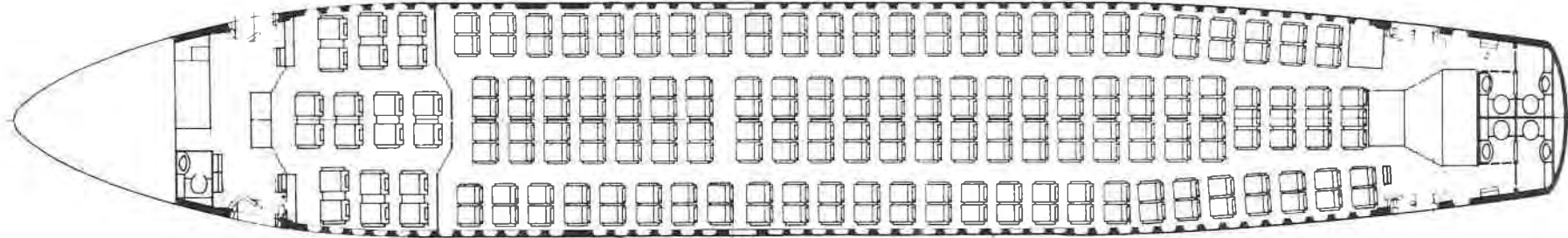
 **A310-300 basic data**

(All weights in kg)

Maximum take-off weight	157 000 (option)	(124 000)
Maximum landing weight	123 000	
Maximum zero fuel weight	113 000	(114 000)
Operating weight empty for INTERFLUG (estimate)	80 000	
Maximum fuel capacity (in litres)	63 270	
(including 7 200 l in additional centre tank)		
Cabin layout for INTERFLUG	20F/198Y	
Study powerplants	CF6-80C2A2/PW4152	

A310-300 interior configuration

218 seats



**20 First class
(38 in pitch)**

**198 Economy class
(34 in pitch)**

A310-300 weight statement

(All weights in kg)

	<u>CF6-80C2A2</u>	<u>PW4152</u>
<u>MANUFACTURER'S WEIGHT EMPTY</u>	70 333	70 274
MWE changes (details next page)	1 902	1 902
<u>MWE FOR INTERFLUG</u>	72 235	72 176
<u>Operator's items</u>		
. Unusable fuel	267	267
. Oil for engines and APU	95	113
. Water for galleys and toilets (2 tanks)	400	400
. Fluids for toilets/waste tanks (5 toilets)	50	50
. Aircraft documents and tool kit	42	35
. Passenger seats incl. life jackets and PES	2 390	2 390
. Galley structure and fixed equipment	673	673
. Catering	1 850	1 850
. Baggage containers (5 LD3s)	375	375
. Emergency equipment (incl. slide rafts)	484	484
. Crew (2x75) + (2x70) + (5x60) + (9x10)	680	680
	<u>7 306</u>	<u>7 317</u>
<u>OPERATING WEIGHT EMPTY</u>	<u>79 541</u>	<u>79 493</u>
OWE for INTERFLUG (assumption for study purposes)	<u>80 000</u>	

MWE Changes - details

	<u>kg</u>
Cabin configuration changes 20F/198Y	-20
Increase design weights MTOW 157 t	40
Passenger individual air outlets	68
Individual audio entertainment system	77
Video projection system	85
Centre hatrack (Y only)	500
Individual reading lights	53
Two zone lighting	10
Second water tank	26
Water quantity preselection	3
Erops kit	65
Second weather radar transceiver	13.5
Flight crew foot warmer	7.5
Category III autoland	16.5
Autobraking	5.5
Second ADF	13.5
Dual FMS	44.0
Electrically operated crew seats	10.5
Fire extinguishers for all lavatories	2.5
Smoke detection system in all lavatories	5.0
Dual high frequency radio	61.5
Additional centre tank	815.0
Total MWE changes	<u>1 902</u>

Operational assumptions

<u>EN-ROUTE PROCEDURES</u>	<u>Climb</u>	<u>Cruise</u>	<u>Descent</u>
Flight to destination	250 kts below 10 000 ft 300 kts/M 0.79 above 10 000 ft	MRC	M 0.79/250 kts
Flight to alternate	250 kts below 10 000 ft 270 kts/M 0.65 above 10 000 ft	MRC	M 0.79/250 kts

FUEL RESERVES AND ALLOWANCES

a) Manoeuvre allowances

	<u>Time</u>	<u>Fuel (kg)</u> <u>CF6-80C2A2/PW4152</u>
. Engine start and taxi out	10 min.	232/254
. Taxi-in	5 min.	93/100
. Take-off	*	*
. Approach and landing	*	*

* Calculated for each specific route.

b) Reserves

- . En-route allowance (5% of trip fuel)
- . Two missed approaches (80% of normal take-off)
- . Diversion to alternate
- . 30 min. holding at 1500 feet
- . Approach and land at alternate

FUEL CAPACITY

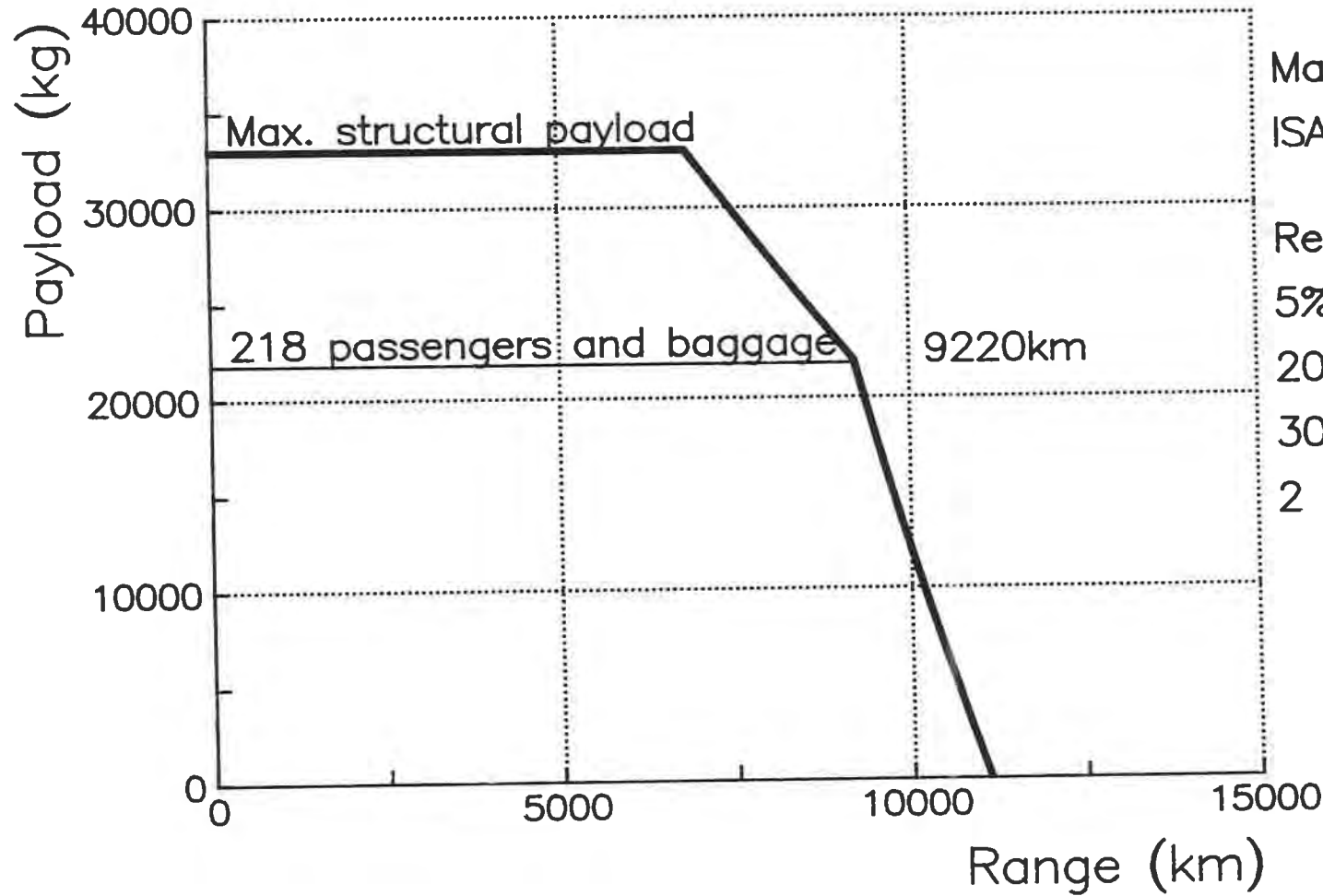
A special tanking procedure allows to increase the nominal fuel capacity by 600 l. This procedure has been applied on the longest routes with maximum fuel requirement.

WINDS, DISTANCES, ALTERNATES, AIRFIELD TEMPERATURES specified by INTERFLUG.



A310-300 payload-range

CF6-80C2A2 engines



Max. range cruise
ISA, still air

Reserves:

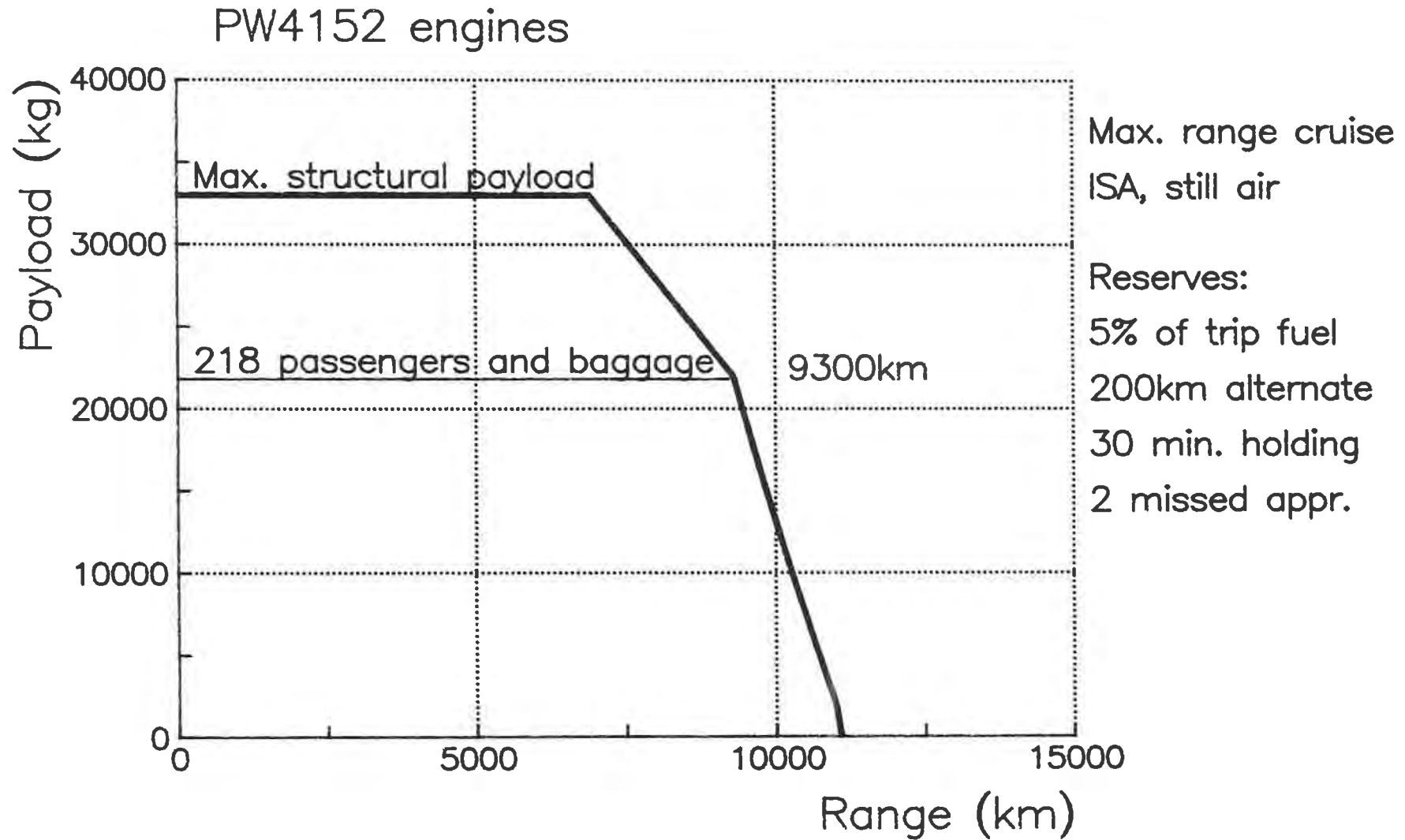
5% of trip fuel

200km alternate

30 min. holding

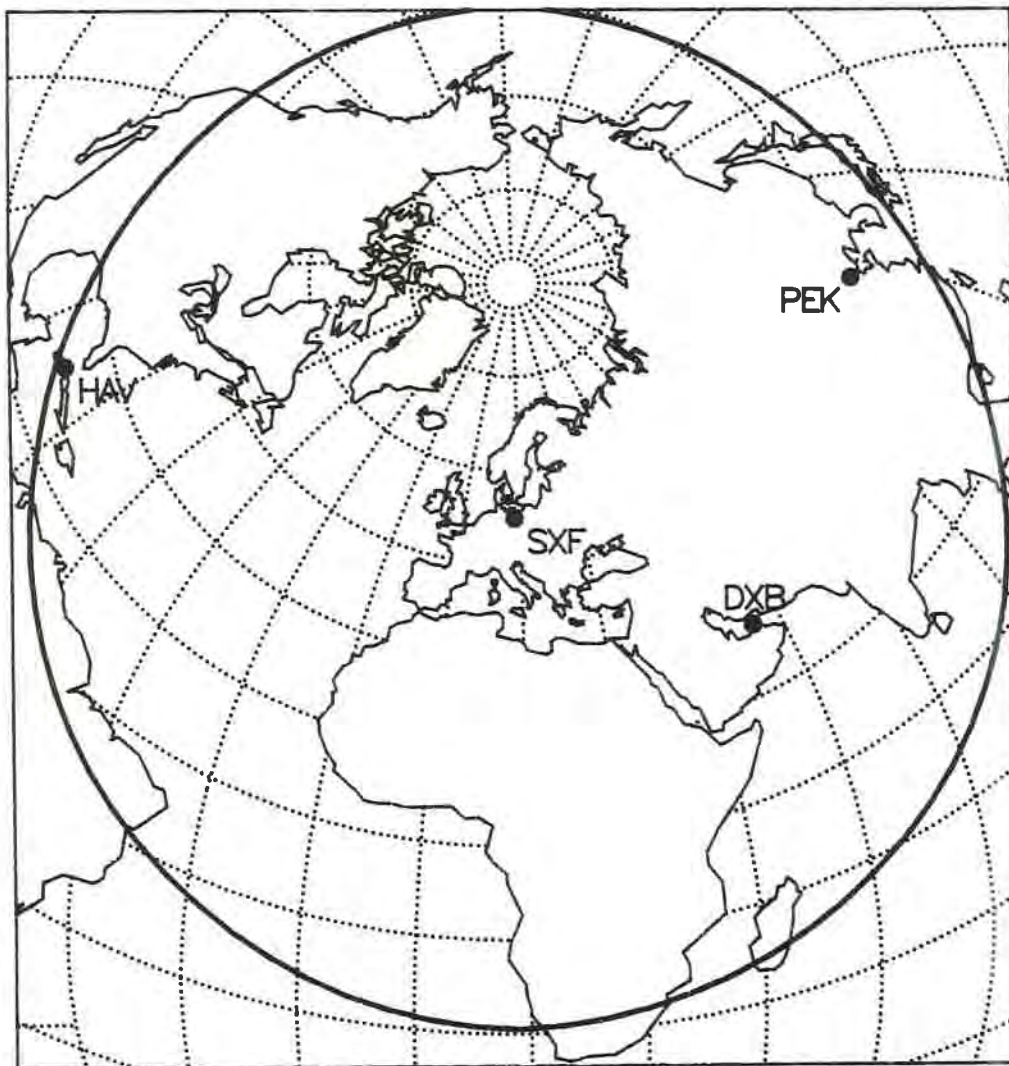
2 missed appr.

A310-300 payload-range





A310-300 range from / to Berlin



218 passengers

INTERFLUG rules

Most severe of
in/outbound wind
(70% annual)

Info from SXF-HAV 8375 km
(IF 8800)

- Wind: 80 km/h ϕ
- Reference point NAS!

A310-300 payload summary

<u>ROUTE</u>	<u>CF6-80C2A2</u>	<u>PW4152</u>
1. SXF-DXB-SIN-DXB-SXF	Max. structural payload (33 t)	
2. SXF-PEK	218 pax + 3.4 t	218 pax + 3.7 t
3. PEK-SXF	218 pax + 4.1 t	218 pax + 4.5 t
4. HAV-SXF	218 pax + 5.3 t	218 pax + 5.7 t
5. SXF-HAV (with reclearance)		
a) HAV1 : alternate CMW	170 pax	184 pax
b) HAV2 : alternate VRA	218 pax + 0.6 t	218 pax + 1 t

INTERFLUG A310-300 CF6-80C2A2

SEGMENT	DEPARTURE		SXF	DXB	SIN	DXB	SXF	PEK
	DESTINATION		DXB	SIN	DXB	SXF	PEK	SXF
	DISTANCE AWYS	KM	5209	5971	5967	5210	7958	7926
	DISTANCE ESAD	KM	5209	5703	6263	5401	7474	8319
DIVERSION	AIRPORT		AUH	KUL	AUH	LEI	TSN	LEI
	DISTANCE AWYS	KM	160	410	160	210	150	210
CRUISE	ALT. (1000FT)		33/37	33/37	31/35	31/35	33/37	31/35/39
	MACH		MRC	MRC	MRC	MRC	MRC	MRC
	WIND	KM/H	0	40	-40	-30	55	-40
DIVERSION	FLIGHT LEVEL		200	300	200	250	190	260
	MACH		MRC	MRC	MRC	MRC	MRC	MRC
	WIND	KM/H	0	0	0	0	0	0
PAYLOAD	PASSENGERS		MAX.	MAX.	MAX.	MAX.	MAX.	MAX.
	FIRST		20	20	20	20	20	20
	ECONOMY		198	198	198	198	198	198
	FREIGHT	KG	11200	11200	11200	11200	8412	4103
	TOTAL PAYLOAD	KG	33000	33000	33000	33000	30212	25903
LIMITED BY							M. D. TOW	M. D. TOW
FUEL	SEGMENT	KG	27700	30898	33957	28876	40490	44367
	TRIP	KG	28313	31593	34639	29553	41137	45037
	BURNT	KG	28638	31918	34964	29878	41462	45362
	ALLOWANCE	KG	1416	1580	1732	1478	2057	2252
	RESERVE	KG	5202	6646	5518	5485	5650	6060
	TOTAL LOADED	KG	33747	38471	40389	35270	47019	51329
TIME	BLOCK TIME	HR-MIN	6-40	7-15	7-55	6-54	9-21	10-22
	FLIGHT TIME	HR-MIN	6-26	7- 1	7-41	6-40	9- 7	10- 8
	BLOCK SPEED	KM/H	781	823	753	754	851	763
TAKE-OFF WEIGHT	REQUIRED	KG	146517	151239	153157	148038	157000	157000
	PERMISSIBLE	KG	157000	157000	157000	157000	157000	157000
LANDING WEIGHT	REQUIRED	KG	118203	119643	118518	118485	115863	111964
	PERMISSIBLE	KG	123000	123000	123000	123000	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000	80000	80000	80000	80000
CL-CR-CL/CR-CL	STEP DIST	KM	3057/1924	4035/1698	1542/4222	722/4283	5129/2588	2151/4825
	PROFILE		1	1	1	1	1	1

REF:7364_29745

INTERFLUG A310-300 CF6-80C2A2

SEGMENT	DEPARTURE		HAV	SXF
	DESTINATION		SXF	NAS
	DISTANCE AWYS KM		8800	8140
DIVERSION	DISTANCE ESAD KM		8041	8990
	AIRPORT		LEI	FPO
	DISTANCE AWYS KM		210	210
CRUISE	ALT. (1000FT)		33/37	31/35/39
	MACH		MRC	MRC
	WIND	KM/H	80	-80
DIVERSION	FLIGHT LEVEL		250	260
	MACH		MRC	MRC
	WIND	KM/H	0	0
PAYLOAD	PASSENGERS		MAX.	MAX.
	FIRST		20	20
	ECONOMY		198	198
	FREIGHT	KG	5384	1013
	TOTAL PAYLOAD	KG	27184	22813
LIMITED BY			M. D. TOW	M. D. TOW
FUEL	SEGMENT	KG	43062	47344
	TRIP	KG	43781	47998
	BURNT	KG	44106	48323
	ALLOWANCE	KG	2189	2400
	RESERVE	KG	6037	6189
	TOTAL LOADED	KG	50050	54419
TIME	BLOCK TIME	HR-MIN	10- 2	11-11
	FLIGHT TIME	HR-MIN	9-48	10-57
	BLOCK SPEED	KM/H	877	728
TAKE-OFF WEIGHT	REQUIRED	KG	157000	157000
	PERMISSIBLE	KG	157000	157000
LANDING WEIGHT	REQUIRED	KG	113219	109002
	PERMISSIBLE	KG	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000
CL-CR-CL/CR-CL	STEP DIST	KM	5257/3297	2050/4583
	PROFILE		1	1

REF:7364_29745

12^h 218 PAX

 5A + Fuel
 234 kg / PAX
 4,25 t/h

 BER - MAV
 Fuel Burn

→ Endrechnung:

(+3%) durch Vorkauf
 (HAW?)
 - keine
 18 h
 2 ACT
 (in meter) (in meter)

Year Ber 2

14,5 auf 13
 194 auf
 11

12^h 218 PAX

51 + Fuel
234 kg / PAX

4,25 to / h

BER - MAU ⚠

Fuel burn

→ Zusammenfassung:

(+3%) durch Alter, Mehrverbrauch -
dabei (MAU?) Verlust von 14,5 auf 13
- wenn 2 ACT, dann von 19,4 auf
18 to reicht (ist mehr als von 15
gefordert!)

Herr Blue! ⚠

INTERFLUG A310-300 CF6-80C2A2
 RECLEARANCE OVER NASSAU

SEGMENT	DEPARTURE		SXF	SXF
	DESTINATION		HAV1	HAV2
	DISTANCE AWYS KM		8800	8800
	DISTANCE ESAD KM		9722	9720
DIVERSION	AIRPORT		CMW	VRA
	DISTANCE AWYS KM		570	130
CRUISE	ALT. (1000FT)		31/35/39	31/35/39
	MACH		MRC	MRC
	WIND	KM/H	-80	-80
DIVERSION	FLIGHT LEVEL		300	180
	MACH		MRC	MRC
	WIND	KM/H	0	0
PAYLOAD	PASSENGERS		78.*	MAX.
	FIRST		20	20
	ECONOMY		150	198
	FREIGHT KG		54	607
	TOTAL PAYLOAD KG		17054	22407
LIMITED BY			M.F.C.	M.D.TOW
FUEL	SEGMENT	KG	49019	50489
	TRIP	KG	49658	51144
	BURNT	KG	49983	51469
	ALLOWANCE	KG	132	132
	RESERVE	KG	5415	3450
	TOTAL LOADED	KG	55305	54826
TIME	BLOCK TIME	HR-MIN	12- 4	12- 3
	FLIGHT TIME	HR-MIN	11-50	11-49
	BLOCK SPEED	KM/H	728	730
TAKE-OFF WEIGHT	REQUIRED	KG	152125	157000
	PERMISSIBLE	KG	157000	157000
LANDING WEIGHT	REQUIRED	KG	102467	105857
	PERMISSIBLE	KG	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000
CL-CR-CL/CR-CL	STEP DISTS	KM	1319/4583	2050/4583
	PROFILE		1	1

REF:7364_29778

ETOPS (120 min - Regel)

↳ nur GE
 (90 min - Regel)

- SNN
 - Y4T
 - BDA + • KEF no es
 - NAS • SFJ blat
 - Y4R W of 44
- min "to 2"!

- reclearance over NAS
- normale ETOPS daten (ohne Umkleitung)
- leichteste AC - variante
- normale leistungswerte
- keine Probe AWH

➔ Payload : 22,4 t

INTERFLUG A310-300 PW4152

SEGMENT	DEPARTURE		SXF	DXB	SIN	DXB	SXF	PEK
	DESTINATION		DXB	SIN	DXB	SXF	PEK	SXF
	DISTANCE AWYS	KM	5209	5971	5967	5210	7958	7926
	DISTANCE ESAD	KM	5209	5704	6262	5401	7476	8318
DIVERSION	AIRPORT		AUH	KUL	AUH	LEI	TSN	LEI
	DISTANCE AWYS	KM	160	410	160	210	150	210
CRUISE	ALT. (1000FT)		33/37	33/37	31/35	31/35	29/33/37	31/35
	MACH		MRC	MRC	MRC	MRC	MRC	MRC
	WIND	KM/H	0	40	-40	-30	55	-40
DIVERSION	FLIGHT LEVEL		200	300	200	240	190	250
	MACH		MRC	MRC	MRC	MRC	MRC	MRC
	WIND	KM/H	0	0	0	0	0	0
PAYLOAD	PASSENGERS		MAX.	MAX.	MAX.	MAX.	MAX.	MAX.
	FIRST		20	20	20	20	20	20
	ECONOMY		198	198	198	198	198	198
	FREIGHT	KG	11200	11200	11200	11200	8692	4537
	TOTAL PAYLOAD	KG	33000	33000	33000	33000	30492	26337
LIMITED BY							M. D. TOW	M. D. TOW
FUEL	SEGMENT	KG	27485	30664	33588	28598	40283	44017
	TRIP	KG	28062	31287	34211	29201	40905	44647
	BURNT	KG	28416	31641	34565	29555	41259	45001
	ALLOWANCE	KG	1403	1564	1711	1460	2045	2232
	RESERVE	KG	5108	6547	5416	5425	5603	6019
	TOTAL LOADED	KG	33424	38088	39881	34880	46762	50920
TIME	BLOCK TIME	HR-MIN	6-39	7-13	7-54	6-53	9-19	10-21
	FLIGHT TIME	HR-MIN	6-25	6-59	7-40	6-39	9- 5	10- 7
	BLOCK SPEED	KM/H	783	826	755	756	853	765
TAKE-OFF WEIGHT	REQUIRED	KG	146170	150834	152626	147628	157000	157000
	PERMISSIBLE	KG	157000	157000	157000	157000	157000	157000
LANDING WEIGHT	REQUIRED	KG	118108	119547	118416	118426	116095	112356
	PERMISSIBLE	KG	123000	123000	123000	123000	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000	80000	80000	80000	80000
CL-CR-CL/CR-CL	STEP DIST	KM	3862/1129	4882/ 861	2361/3411	1559/3453	896/5163	3059/4674
	PROFILE		1	1	1	1	1	1

REF:7365__5639

INTERFLUG A310-300 PW4152

SEGMENT	DEPARTURE		HAV	SXF
	DESTINATION		SXF	NAS
	DISTANCE AWYS	KM	8800	8140
	DISTANCE ESAD	KM	8045	8987
DIVERSION	AIRPORT		LEI	FPO
	DISTANCE AWYS	KM	210	210
CRUISE	ALT. (1000FT)		29/33/37	31/35/39
	MACH		MRC	MRC
	WIND	KM/H	80	-80
DIVERSION	FLIGHT LEVEL		250	250
	MACH		MRC	MRC
	WIND	KM/H	0	0
PAYLOAD	PASSENGERS		MAX.	MAX.
	FIRST		20	20
	ECONOMY		198	198
	FREIGHT	KG	5703	1485
	TOTAL PAYLOAD	KG	27503	23285
LIMITED BY			M.D.TOW	M.D.TOW
FUEL	SEGMENT	KG	42851	46978
	TRIP	KG	43502	47604
	BURNT	KG	43856	47958
	ALLOWANCE	KG	2175	2380
	RESERVE	KG	5994	6112
	TOTAL LOADED	KG	49750	53970
TIME	BLOCK TIME	HR-MIN	10- 0	11- 9
	FLIGHT TIME	HR-MIN	9-46	10-55
	BLOCK SPEED	KM/H	879	729
TAKE-OFF WEIGHT	REQUIRED	KG	157000	157000
	PERMISSIBLE	KG	157000	157000
LANDING WEIGHT	REQUIRED	KG	113497	109398
	PERMISSIBLE	KG	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000
CL-CR-CL/CR-CL	STEP DIST	KM	915/5305	2912/4650
	PROFILE		1	1

REF:7365__5639

INTERFLUG A310-300 PW4152
 RECLEARANCE OVER NASSAU

SEGMENT	DEPARTURE		SXF	SXF
	DESTINATION		HAV1	HAV2
	DISTANCE AWYS	KM	8800	8800
	DISTANCE ESAD	KM	9718	9716
DIVERSION	AIRPORT		CMW	VRA
	DISTANCE AWYS	KM	570	130
CRUISE	ALT. (1000FT)		31/35/39	31/35/39
	MACH		MRC	MRC
	WIND	KM/H	-80	-80
DIVERSION	FLIGHT LEVEL		300	170
	MACH		MRC	MRC
	WIND	KM/H	0	0
PAYLOAD	PASSENGERS		84.8	MAX.
	FIRST		20	20
	ECONOMY		164	198
	FREIGHT	KG	81	1066
	TOTAL PAYLOAD	KG	18481	22866
LIMITED BY			M.F.C.	M.D.TOW
FUEL	SEGMENT	KG	49078	50109
	TRIP	KG	49689	50736
	BURNT	KG	50043	51090
	ALLOWANCE	KG	132	132
	RESERVE	KG	5360	3400
	TOTAL LOADED	KG	55303	54390
TIME	BLOCK TIME	HR-MIN	12- 2	12- 1
	FLIGHT TIME	HR-MIN	11-48	11-47
	BLOCK SPEED	KM/H	730	731
TAKE-OFF WEIGHT	REQUIRED	KG	153528	157000
	PERMISSIBLE	KG	157000	157000
LANDING WEIGHT	REQUIRED	KG	103841	106265
	PERMISSIBLE	KG	123000	123000
OPERATING WEIGHT	EMPTY	KG	80000	80000
CL-CR-CL/CR-CL	STEP DIST	KM	2387/4650	2912/4650
	PROFILE		1	1

REF:7365__5074



The statements made herein do not constitute an offer. They are based on the assumptions shown and are expressed in good faith. Where the supporting grounds for these statements are not shown the Company will be pleased to explain the basis thereof.

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