

APPENDIX

Base-Line Aircraft Operating Costs (Average per Block Hour)

As of: Summer 2000

Aircraft Types	Typical Fuel cons. (US gallon)	Costs Other (Note 1.)	Costs Fuel	Total Operating Costs (Per block hour)
A300-600	1,868	\$2,002.00	\$1,588.00	\$3,590.00
A319	821	\$1,458.00	\$698.00	\$2,156.00
A320	886	\$1,520.00	\$753.00	\$2,273.00
A321	926	\$1,736.00	\$787.00	\$2,523.00
A330-200	1,762	\$2,203.00	\$1,498.00	\$3,701.00
A330-300	1,871	\$2,213.00	\$1,590.00	\$3,803.00
A340-300	2,174	\$2,225.00	\$1,848.00	\$4,073.00
A340-600	2,584	\$2,654.00	\$2,196.00	\$4,850.00
ATR-42	200	\$1,006.00	\$140.00	\$1,146.00
ATR-72	214	\$1,353.00	\$150.00	\$1,503.00
B-727-200	1064	\$1,874.00	\$745.00	\$2,619.00
B-737-200	796	\$1,430.00	\$557.00	\$1,987.00
B-737-200C	1136	\$1,981.00	\$795.00	\$2,776.00
B-737-300/700	690	\$1,510.00	\$483.00	\$1,993.00
B-737-400	806	\$1,686.00	\$564.00	\$2,250.00
B-737-800	564	\$1,188.00	\$395.00	\$1,583.00
B-737-500	804	\$1,513.00	\$563.00	\$2,076.00
B747-100	4009	\$4,950.00	\$2,806.00	\$7,756.00
B-747-200	4023	\$5,608.00	\$2,816.00	\$8,424.00
B-747-400	3743	\$4,141.00	\$2,620.00	\$6,761.00
B-757-200	900	\$2,055.00	\$630.00	\$2,685.00
B-767-200	1217	\$2,365.00	\$852.00	\$3,217.00
B-767-300	1297	\$2,490.00	\$908.00	\$3,398.00
B-777-200	1929	\$2,799.00	\$1,350.00	\$4,149.00

Base-Line
Aircraft Operating Costs (Continued)
(Average per Block Hour)

As of: Summer 2000

Aircraft Types	Typical Fuel cons. (US gallon)	Costs Other (Note 1.)	Costs Fuel	Total Operating Costs (Per block hour)
BAE 146-300	856	\$1,986.00	\$599.00	\$2,585.00
CRJ-100	484	\$1,110.00	\$339.00	\$1,449.00
CRJ-200	533	\$758.00	\$373.00	\$1,131.00
DC-9-10	833	\$1,438.00	\$583.00	\$2,021.00
DC-9-30	904	\$1,524.00	\$633.00	\$2,157.00
DC-9-40	967	\$960.00	\$677.00	\$1,637.00
DC-9-50	774	\$1,207.00	\$542.00	\$1,749.00
DC-10-10	1793	\$3,971.00	\$1,255.00	\$5,226.00
DC-10-30	2501	\$4,216.00	\$1,751.00	\$5,967.00
DC-10-40	2236	\$3,864.00	\$1,565.00	\$5,429.00
DHC 8-100	246	\$907.00	\$172.00	\$1,079.00
EMB-120	156	\$938.00	\$109.00	\$1,047.00
ERJ-135	340	\$656.00	\$238.00	\$894.00
ERJ-145	349	\$767.00	\$244.00	\$1,011.00
MD-11	2176	\$3,092.00	\$1,523.00	\$4,615.00
MD-80	799	\$1,726.00	\$559.00	\$2,285.00
MD-87	741	\$1,301.00	\$519.00	\$1,820.00
MD-90	621	\$2,301.00	\$435.00	\$2,736.00
L-1011-500	1589	\$3,075.00	\$1,112.00	\$4,187.00

15-Jan-2000

Assumptions/Conversions**Distances**

1 nautical mile	<i>equals</i>	1.1516 statute mile
1 nautical mile	<i>equals</i>	1.853 kilometers
1 statute mile	<i>equals</i>	.8684 nautical mile
1 statute mile	<i>equals</i>	1.609 kilometers
1 kilometer	<i>equals</i>	.5396 nautical mile
1 kilometer	<i>equals</i>	.6214 statute mile

Speed

Mach 1. *assumed* 480 knots

Weight

1 US gallon	<i>equals</i>	6.7 Lbs
1 Kilogramme	<i>equals</i>	2.2 Lbs

Price of fuel/US gallon
(average)

In the USA (Early 2000)	.70 per US gallon
Outside the US (Early 2000)	.85 per US gallon

Average Cruising Speed of Aircraft

Mach .8 or 480 knots

**Base-Line
CNS/ATM Costs**

(US dollars)

As of: Summer 2000

Systems	Costs				
	Purchase	Upgrade/ retrofit Kit	Installation (same site)	Maintenance	Inspection/ commissioning
<i>Communications aircraft</i>					
AMSS Package (See notes)	\$650,000				
HF data upgrade		\$20,000			
FMS Retrofit (See Note)		\$300,000			
FANS-1 retrofit (see note)		\$134,000			
<i>Communications ground</i>					
VHF	\$170,000	\$51,000	\$20,000	\$17,000	
HF	\$160,000	\$48,000	\$20,000	\$16,000	
AMSS ground Station	\$15,000,000		(included)	\$1,500,000	
ATN Router	\$120,000		(included)	\$12,000	
ATN gateway	\$100,000		(included)	\$10,000	
<i>Navigation aircraft</i>					
GPS for FANS-1 PACKAGE (DUAL)	\$58,000				
FMS retrofit (MD-11)	\$300,000				
FMS retrofit (b-747-400)	\$100,000				
MMR for GBAS (DIGITAL)	\$30,000				
MMR for GBAS (ANALOG)	\$40,000				
<i>Navigation Ground</i>					
VOR	\$135,000	\$45,000	\$50,000	\$9,700	\$5000/\$50000
DME	\$125,000	\$38,000	\$50,000	\$8,000	\$5000/\$50000
VOR/DME	\$17,429	\$80,000	\$90,000	\$12,200	\$125000/\$50000
DVOR/DME	\$525,000	\$160,000	\$100,000		
NDB (100 WATTS)	\$30,000	\$10,000	\$15,000	\$3,000	\$5,000
TACAN	\$525,000	\$240,000			
GNSS Master Station	\$8,000,000				
GNSS Uplink	22,000,000/year				
GNSS reference Station	\$1,000,000				
GBAS	\$850,000				
<i>Landing Aids</i>					
ILS Cat I	\$500,000	\$290,000	\$200,000	\$17,100	\$50,000
ILS Cat II	\$1,100,000	\$540,000	\$225,000	\$17,100	\$50,000
ILS Cat III	\$1,250,000	\$540,000	\$225,000	\$17,100	\$50,000
<i>Control Center</i>					
Work Station (CPDLC)	\$350,000		(included)		\$35,000.00
FANS-1 Work Station (see Note)	\$540,000		(included)		\$54,000.00
ATM FDPS	\$950,000		(included)		\$95,000.00
CNS/ATM Syst. (2 seats)	\$2,000,000		(included)		\$200,000.00
Additional seats	\$650,000		(included)		\$65,000.00

**Notes and Observations
on
Base-line CNS/ATM costs**

As of summer 2000

Notes

- 1 The target aircraft for the fitting of the FANS-1 Package are the B-747-400, B-757, B-767 and B-777
- 2 All B-777 come factory equipped but not switched on.
- 3 Factory Options are available for the B-747, B-757 and B-767
- 4 Included in the cost are: new cockpit printer and MCDU to provide ATC menus, HMI etc and FMC software upgrade (does not include Dual TSO GPS)
- 5 Prices related to FANS-1 package will be upgraded to include FANS-A package
- 6 FANS-1 (not an ICAO Standard) is used for the transmission of AOC and ADS messages
- 7 FANS-1 packages usually fitted during an aircraft "C" check and takes appx 2 Additional days
- 8 Basic communication systems costs is for dual TRX/RX, monitors, ups, ETC.
- 9 Basic communication systems installation costs includes FAT, SAT, Training etc.
- 10 A typical VHF ground communication system is usually composed of 10 frequencies, TX/RX 25 watts, antennas, remote control, batteries, etc.
- 11 If a voice communication system is also involved, add \$200,00 to the cost of the basic equipment.
- 12 A typical HF ground communication system is composed of 10 frequencies, TX/RX 100 watss, etc.
- 13 Basic flying cost for flight check and commissioning is \$2500/hr.
- 14 Upgrade Kits are usually between 30% and 40% of purchase cost.
- 15 Cost of freight and insurance costs are not included and amount to appx. 5% to 10% of purchase cost.
- 16 For Wide Area augmentation systems, the cost of the ground network to link all stations must be added
- 17 When GBAS is also used as a WAAS reference station the cost of the ground communication network must also be added.
- 18 Software support for ATC systems usually amounts to 20% of the software cost which is approximately 50% of system cost.
- 19 ATC systems interface to radar processor is approximately \$250000.

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