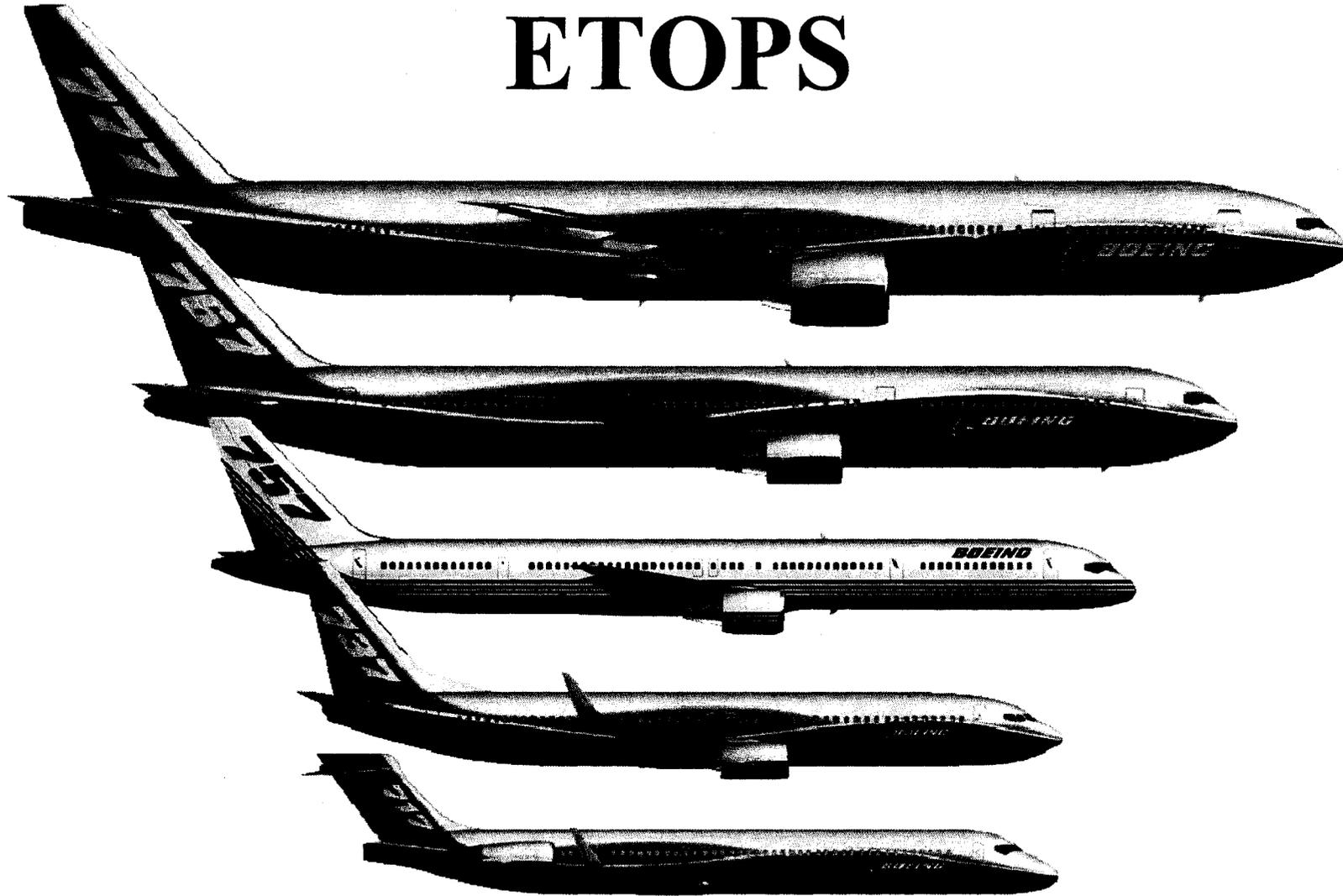


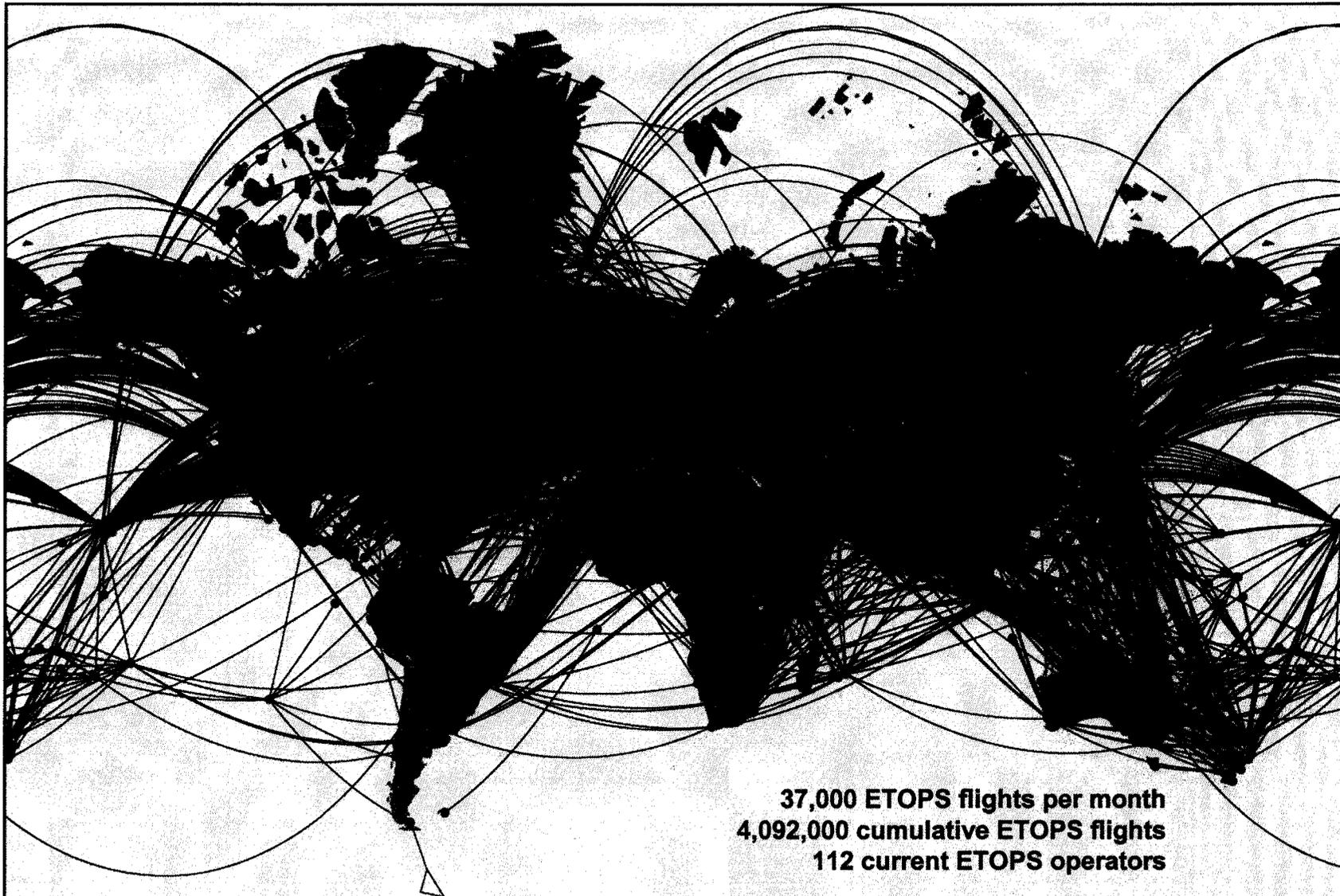
# Extended Range Operations ETOPS



**Boeing Commercial Airplanes Group  
March 2006**

# Boeing ETOPS Operations Are Routine Worldwide\*

*Through March 2006*



\* 737, 757, 767, and 777. Note: Besides scheduled commercial flights, this map also includes charter and some VIP ETOPS flights.

767-ET-0020-ppt  
6-20-6-DH/KW/CJ

# ETOPS Is Firmly Established in the Pacific

## Through March 2006



### 737 Operators

Aircalin\*\*  
 Air Nauru  
 Air New Zealand  
 Air Pacific  
 Airwork  
 Air Vanuatu  
 Aloha Airlines  
 American Trans Air  
 Asiana Airlines\*\*  
 Ansett Australia\*\*  
 China Airlines  
 Continental Micronesia  
 Freedom Air\*\*  
 Jet Connect  
 Miami Air  
 Pacific Blue Airlines  
 Polynesian Airlines\*\*  
 Qantas Airways  
 Royal Tongan Airlines\*\*  
 Solomon Airlines\*\*  
 TACA\*\*  
 WestJet Airlines

### 757 Operators

Air 2000\*\*  
 Air Holland\*\*  
 America West  
 American Airlines\*\*  
 American Trans Air  
 Britannia Airways\*\*  
 Canada 3000 Airlines\*\*  
 China Southern  
 Condor  
 Continental Airlines  
 First Choice Airways\*\*  
 Harmony Airways  
 Holland Excel  
 Icelandair  
 Monarch Airlines\* \*\*  
 North American Airlines  
 Northwest Airlines  
 Omni Air International  
 Royal Airlines\*\*  
 Royal Brunei Airlines\* \*\*  
 TAESA\*\*  
 Thomsonfly  
 Trans World Airlines\*\*  
 United Airlines

### 777 Operators

Air China\*  
 Air New Zealand  
 All Nippon Airways  
 American Airlines  
 Asiana Airlines  
 Austrian Airlines  
 British Airways  
 Cathay Pacific\*  
 China Southern Airlines  
 Continental Airlines  
 Delta Air Lines

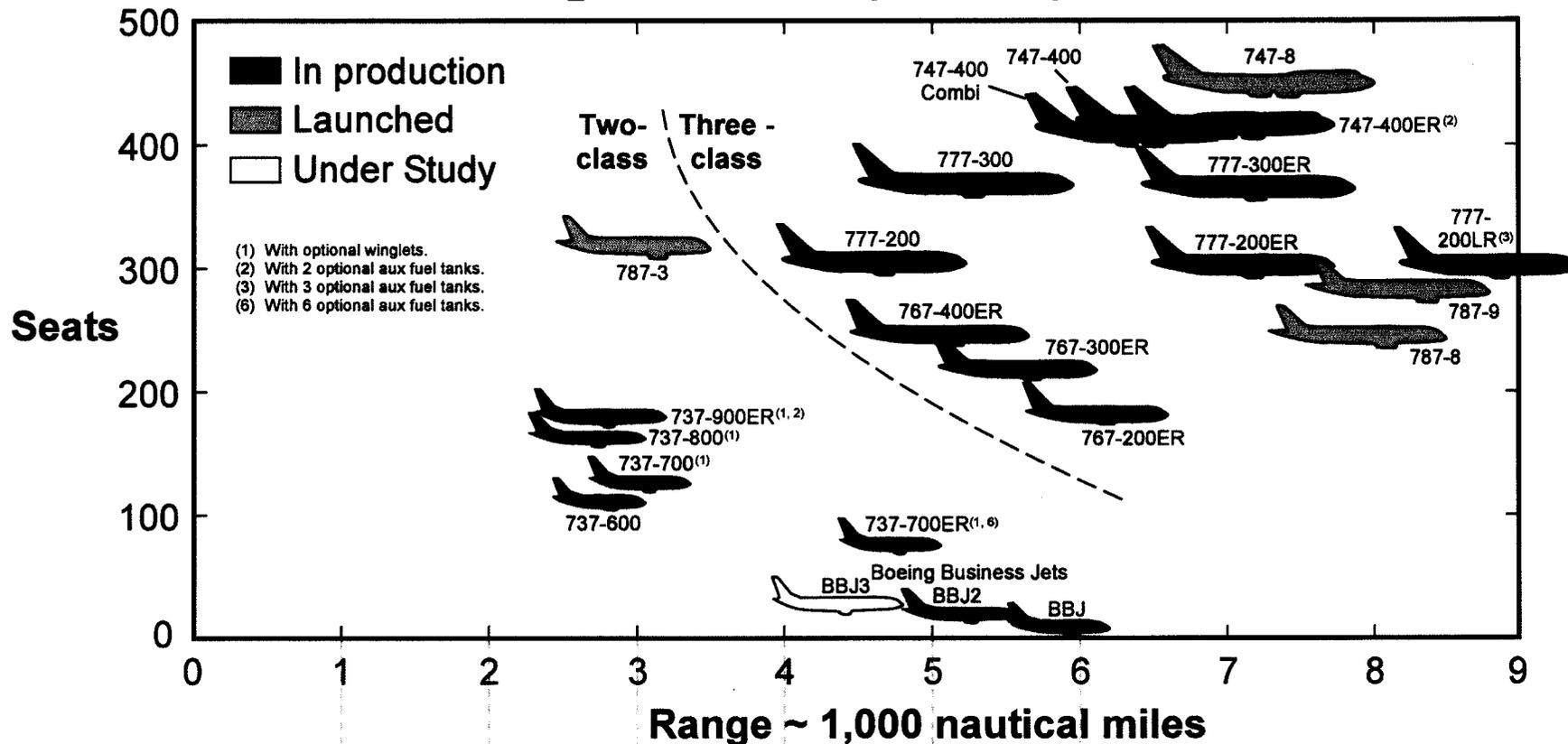
### 767 Operators

Air Caledonie (Aircalin)\*\*  
 Air Canada  
 Air China\*  
 Air Europa\*\*  
 Air New Zealand  
 Air Niugini  
 Air Pacific  
 Air Tours Int'l\*\* \*\*  
 All Nippon Airways  
 American Airlines  
 Ansett Australia\*\*  
 Asiana Airlines  
 Australian Airlines  
 Austrian Airlines\*  
 Balkan Bulgarian\*\*  
 Britannia Airways\*\*  
 Canadian Airlines Int'l\*\*  
 Condor\*  
 Continental Airlines  
 Delta Air Lines  
 Egyptair\*\* \*\*  
 EVA Airways  
 Gulfair\*  
 Hawaiian Airlines  
 Japan Airlines  
 LAN-Chile Airways  
 Lauda Air\*\*  
 Luftransport-Sued\* \*\*  
 Malev Hungarian\*  
 North American Airlines\*\*  
 Polynesian Airlines\*\*  
 Qantas Airways  
 Royal Brunei Airlines\*  
 Thomsonfly\*  
 Trans World Airways\*\*  
 United Airlines  
 United Parcel Service  
 Varig Airlines\*\*

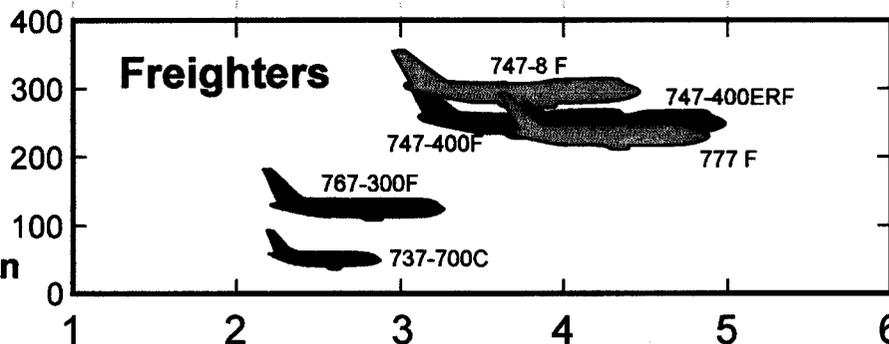
\* These operators flew ETOPS only in the Southeast Asia - Australian portion of this map.

\*\* No longer operating in the Pacific

# The Current Boeing Family Offers A Complete Variety of Payloads/Ranges



**Freighter Maximim Revenue Payloads (x 1,000 lbs.) at ranges shown**

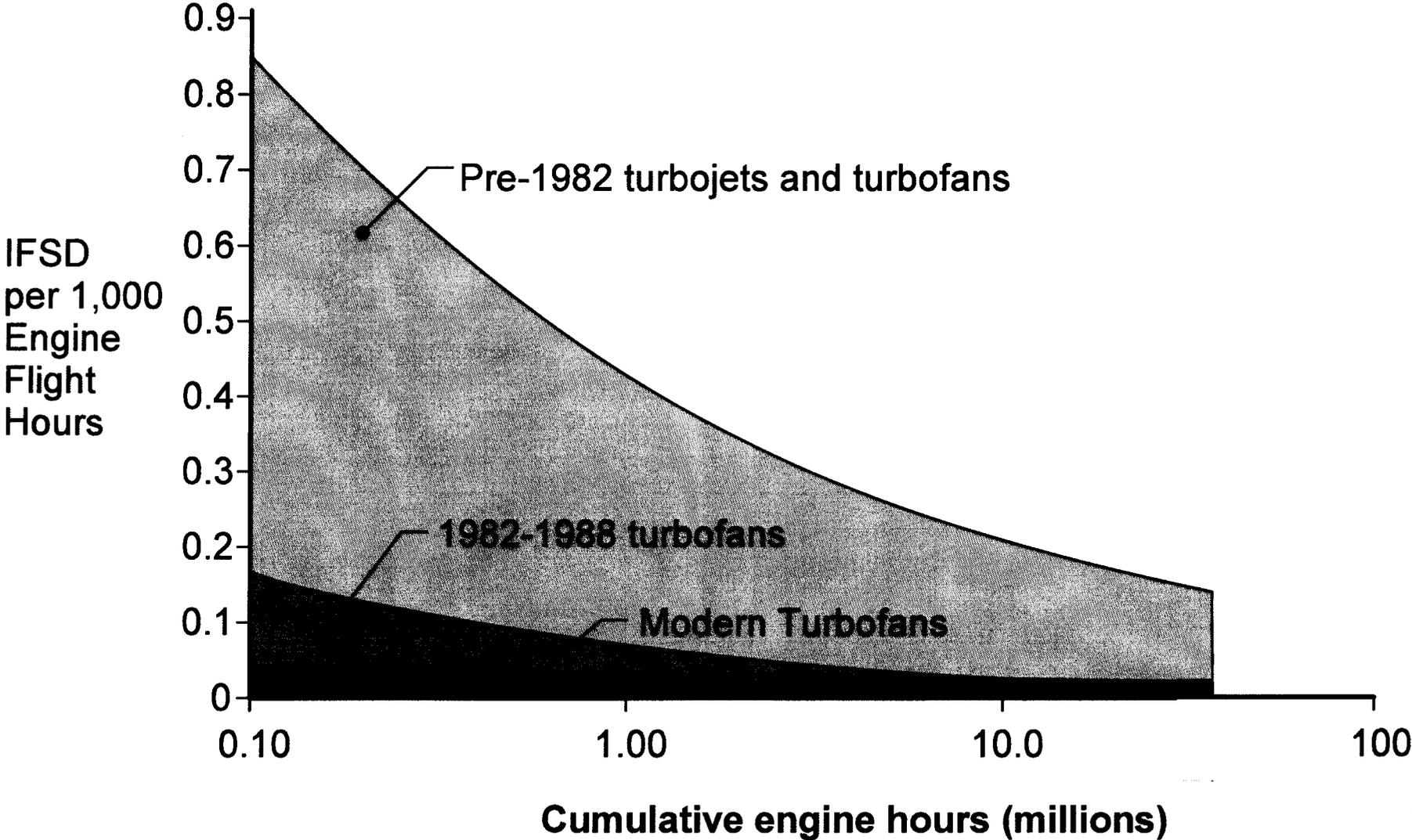


Freighters shown at Maximum Structural/Revenue Payload, excluding tare weight. All have longer range capability with lighter payloads.

On both charts, nose of each airplane indicates the chart data point.

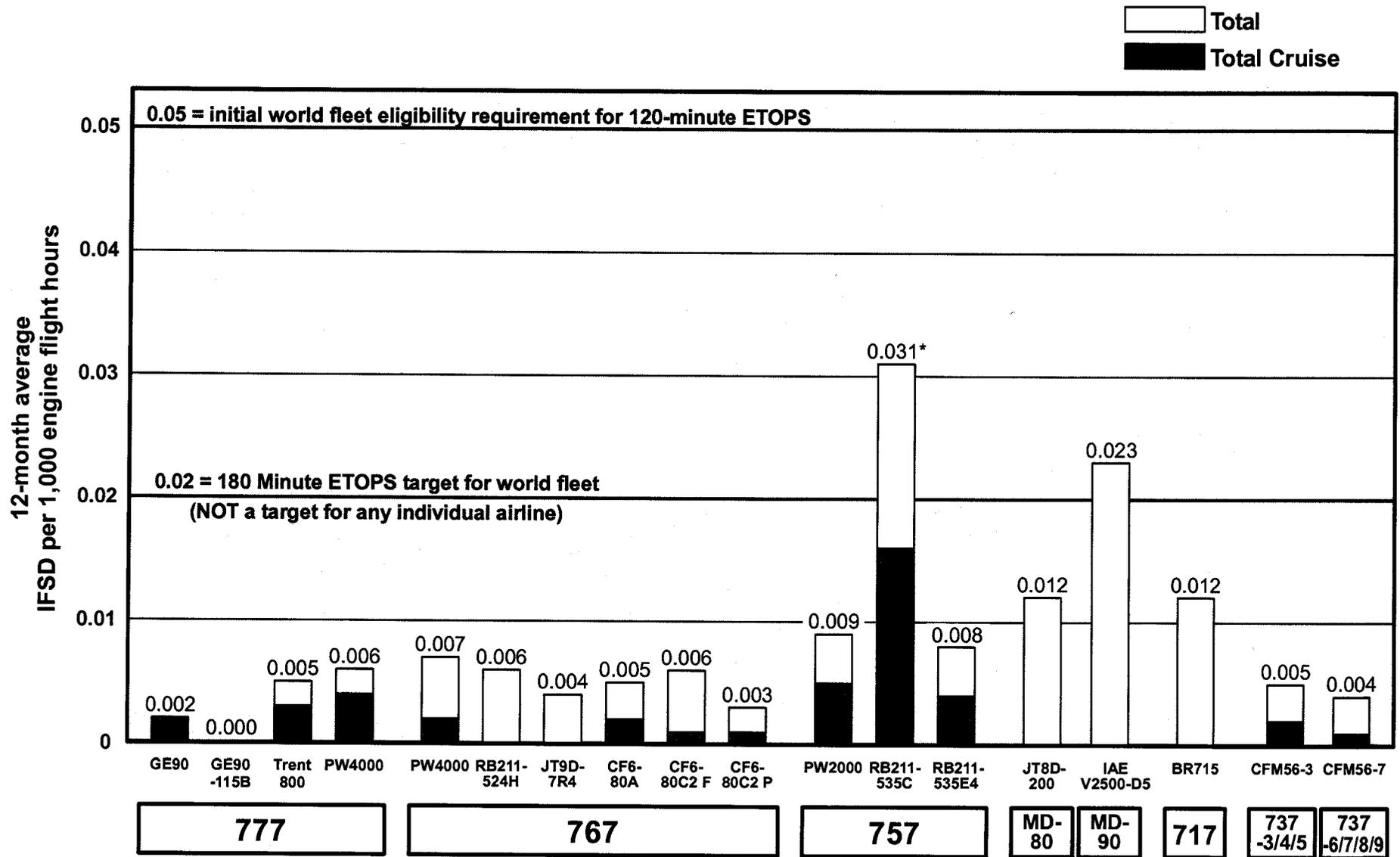
June 2006  
Product Development

# Inflight Shutdown Rates of Today's Engines Have Improved Significantly



# World Fleet IFSD Rates of Boeing Twins

## 12-Month Average as of March 31, 2006

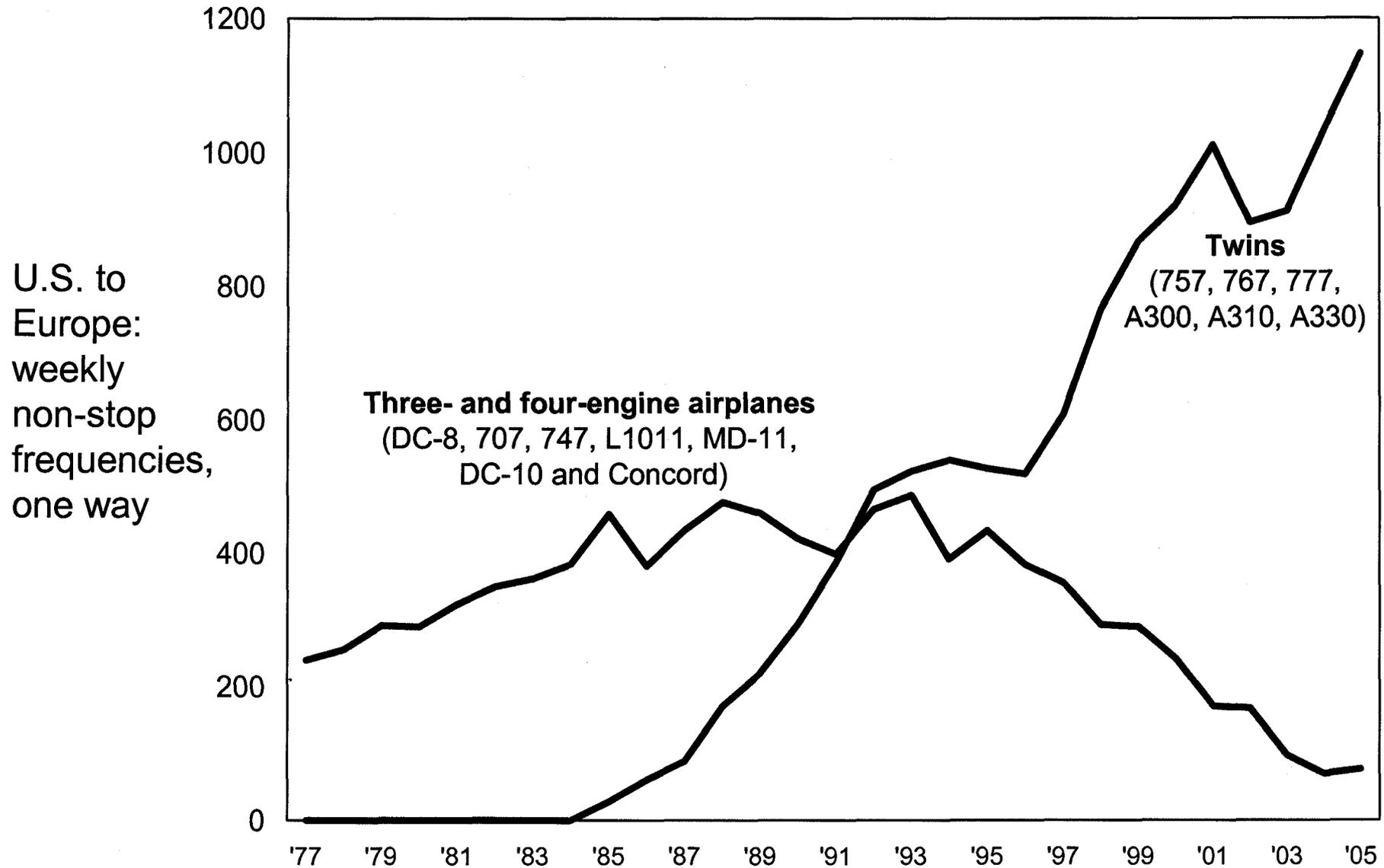


\* 757/RB211-535C world fleet had only 2 IFSDs and 32,000 airplane flight hours in 12 months (neither on ETOPS operators).

For MD80, MD90 and 717, only the total rate is shown.

# For US Airlines On North Atlantic Routes, Twins Dominate

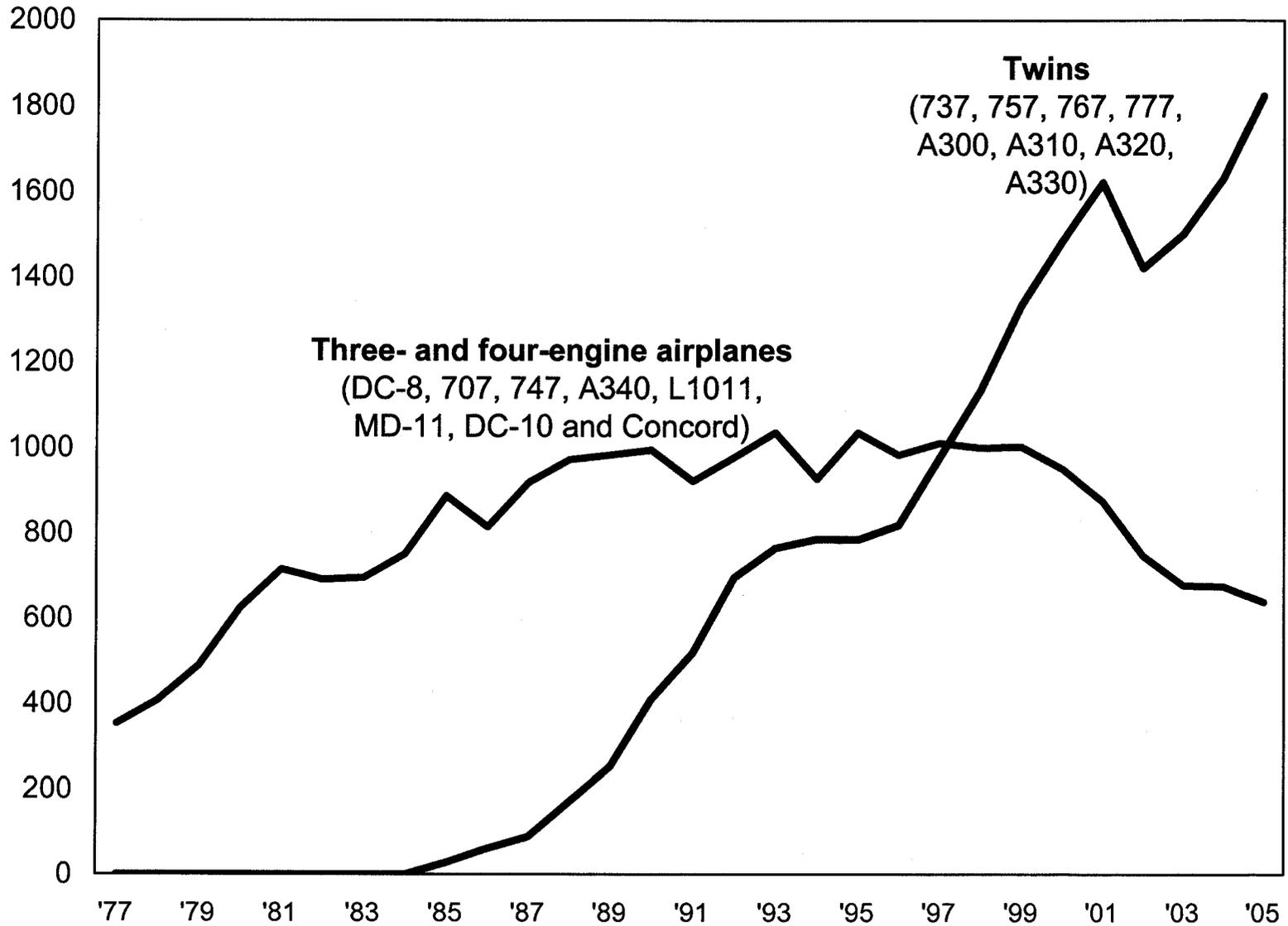
*As of August 2005 OAG*



# North Atlantic Scheduled Twin Operations are More Than Double Those of 3 & 4-Engine Airplanes

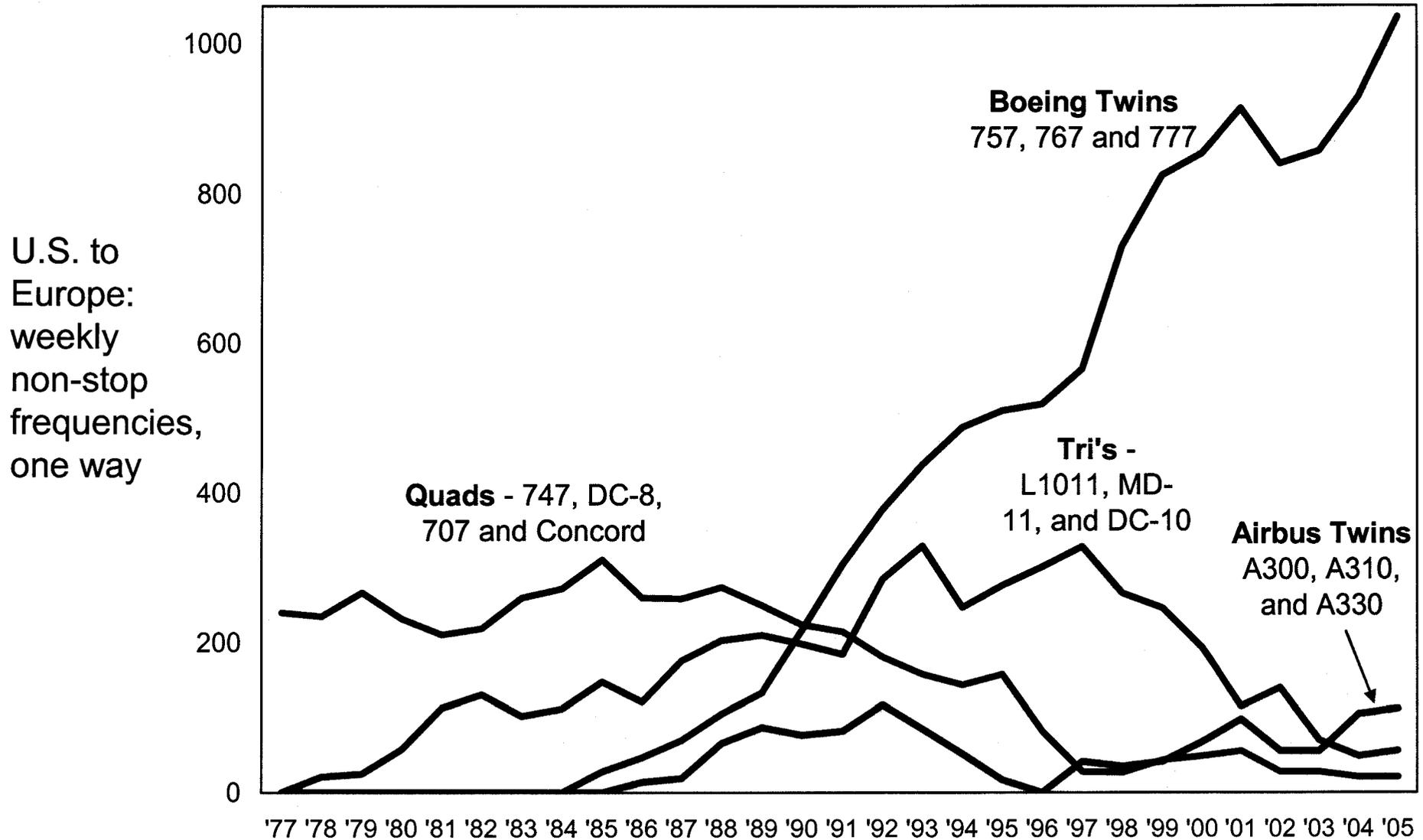
*As of August 2005 OAG*

**U.S. to Europe:  
weekly  
nonstop  
frequencies,  
one way,  
U.S. and  
European  
airlines**



# Boeing Twins Are Changing the World

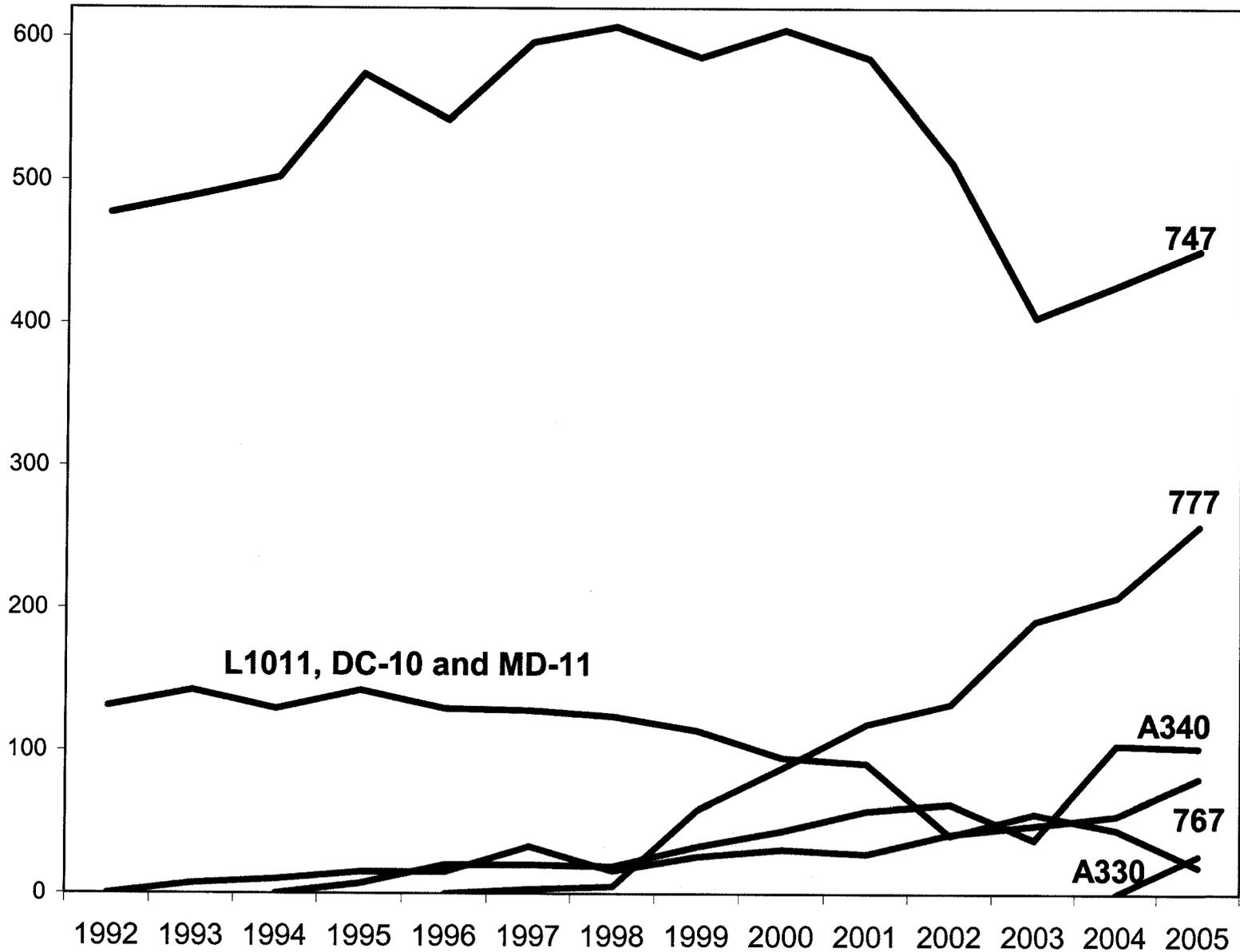
*North Atlantic Air Traffic Patterns, U.S. Airlines - As of August 2005 OAG*



# Boeing Twins Are Changing The World

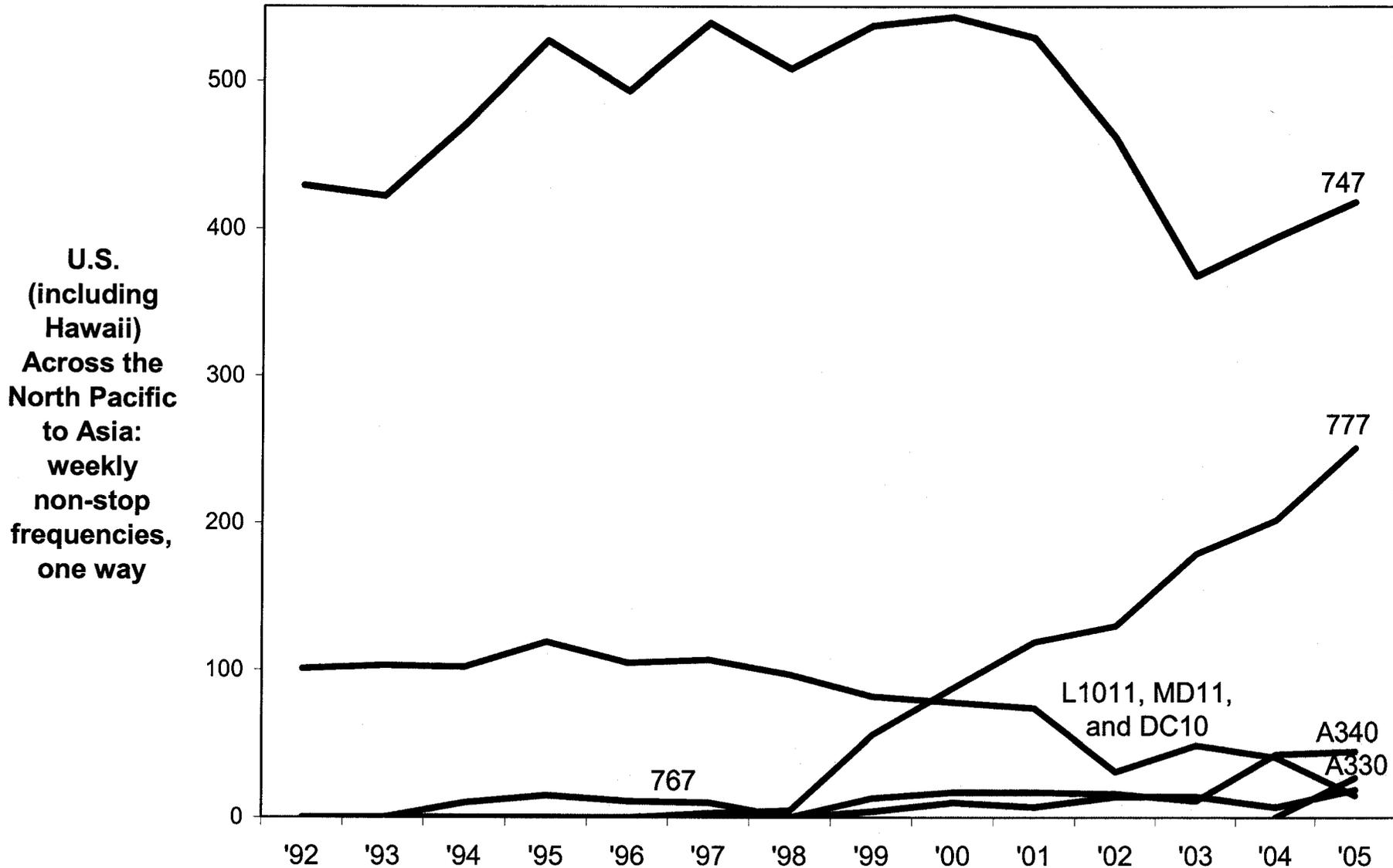
*North Pacific Routes from OAG - August of each year*

**U.S.  
(including  
Hawaii)  
and Canada  
Across the  
North Pacific  
to Asia:  
weekly  
non-stop  
frequencies,  
one way**



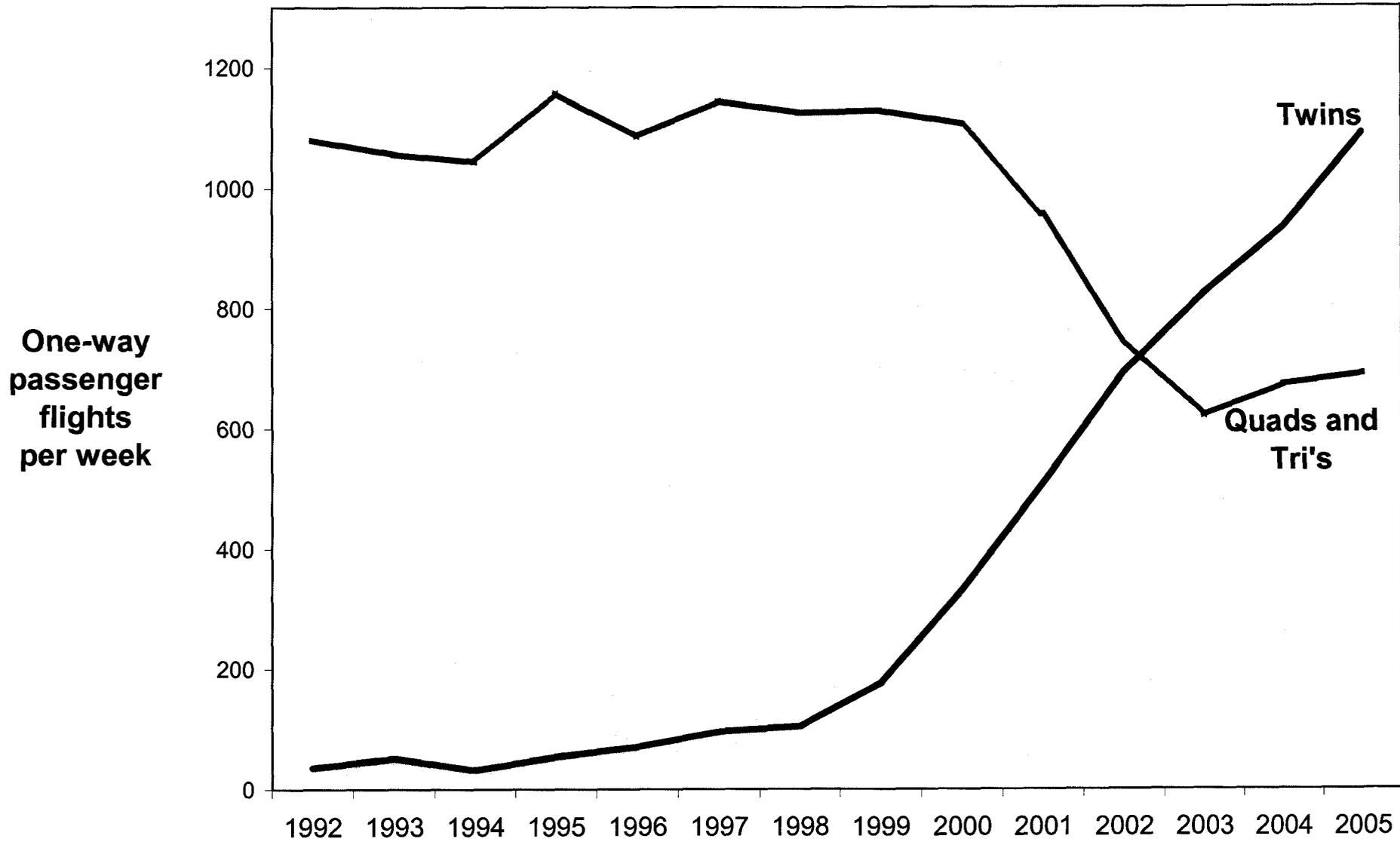
# Boeing Twins Are Changing The World

*U.S. and Asian Airlines on North Pacific Routes -As of August 2005 OAG*



# Trans-Pacific Flights

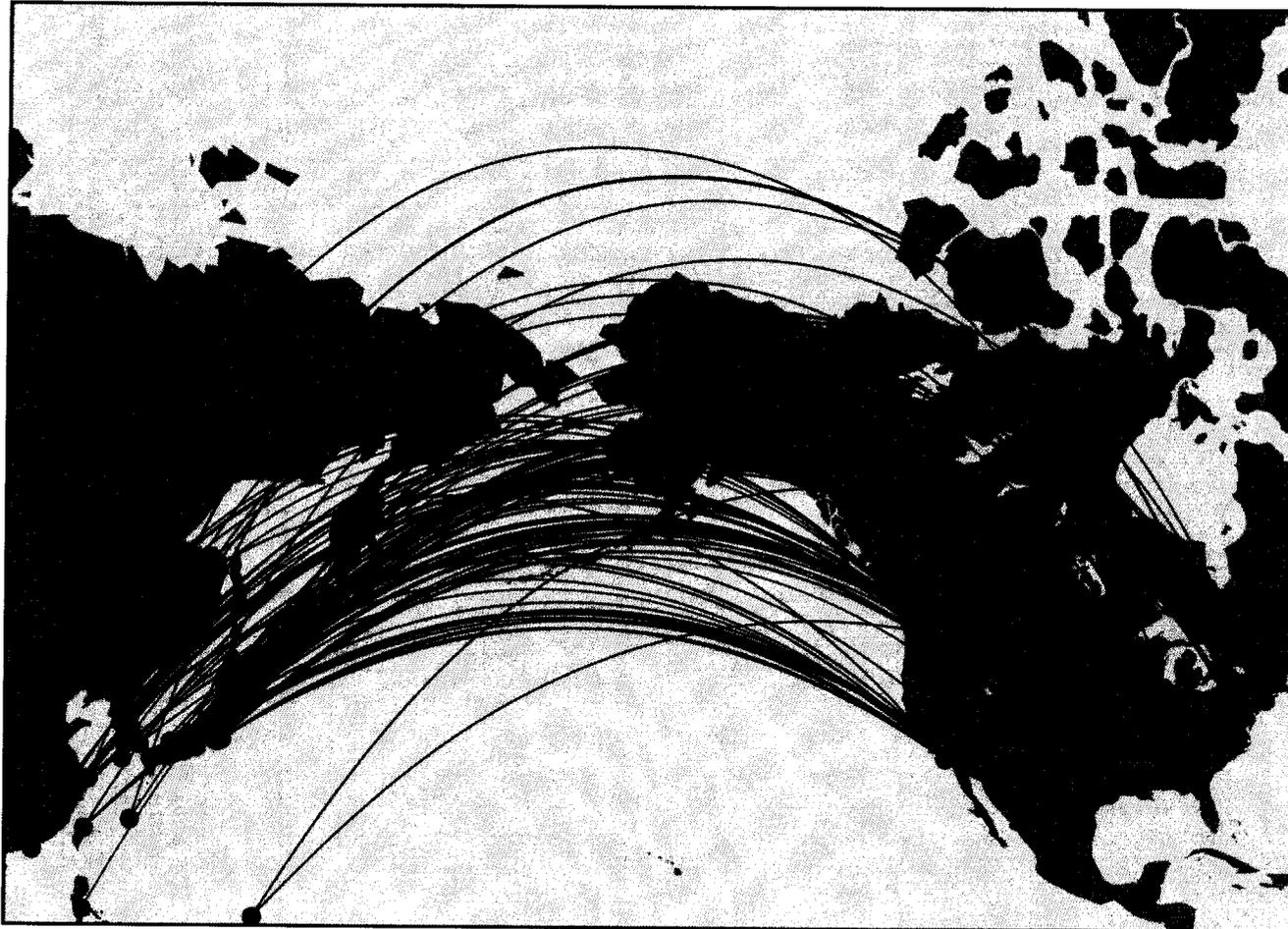
1992 - 2005



From August Official Airline Guide (OAG) each year. Non-stop passenger flights from America (North, Central or South, but excluding Alaska) to Hawaii or Asia or Australia/New Zealand. And from Hawaii to Asia or Australia/New Zealand.

# North Pacific ETOPS Routes

*Through March 2006*



## 757 Operators

Air 2000  
American Trans Air  
TAESA

## 767 Operators

Air Canada  
Air China  
Asiana Airlines  
United Parcel Service  
Varig Airlines\*

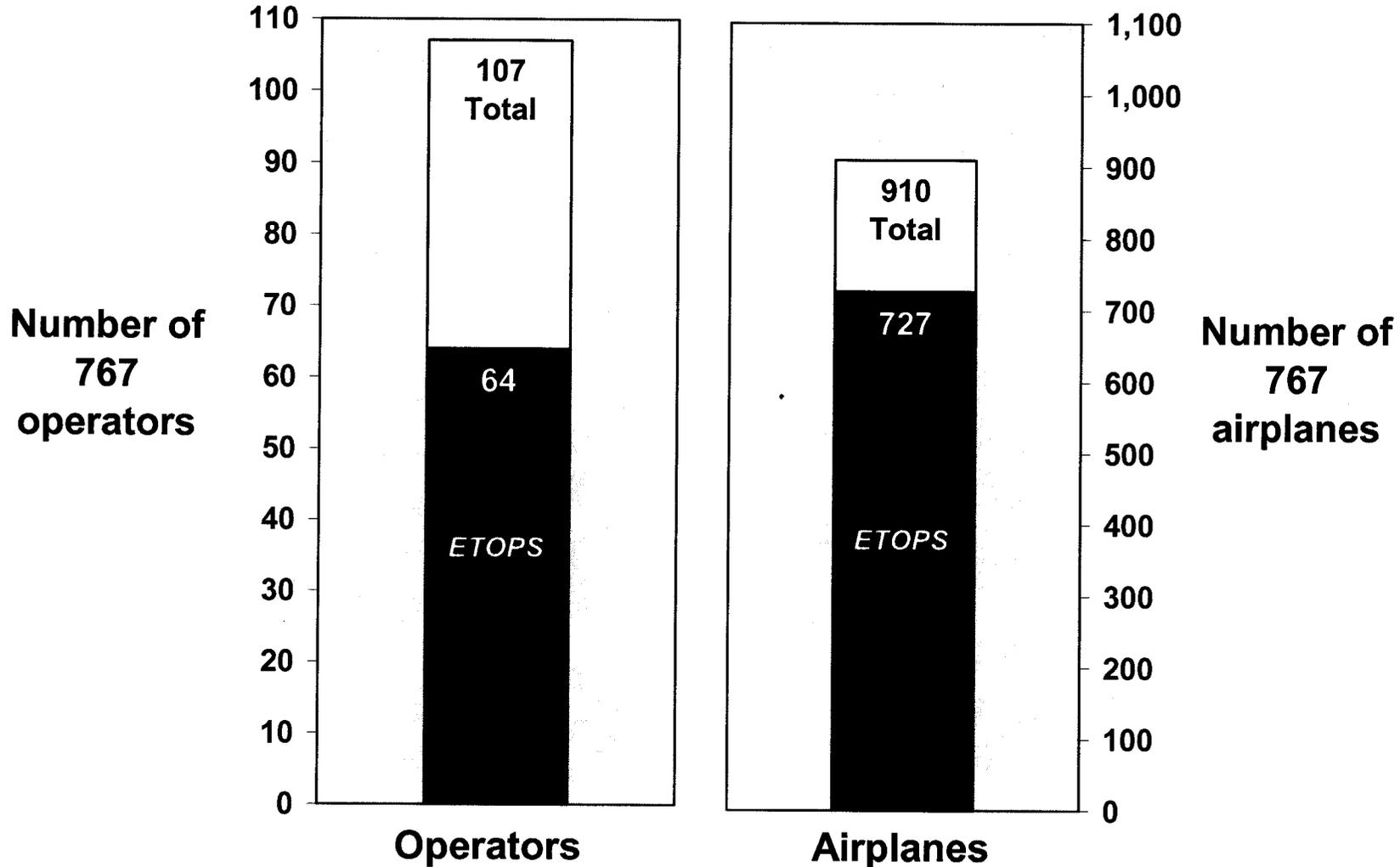
## 777 Operators

All Nippon Airways  
American Airlines  
Asiana Airlines  
British Airways\*  
China Southern  
Continental Airlines  
Delta Air Lines  
Korean Airlines  
Singapore Airlines  
United Airlines

\* Few flights

# ETOPS is Widely Accepted

*767 Fleet Data Summary - March 31, 2006*

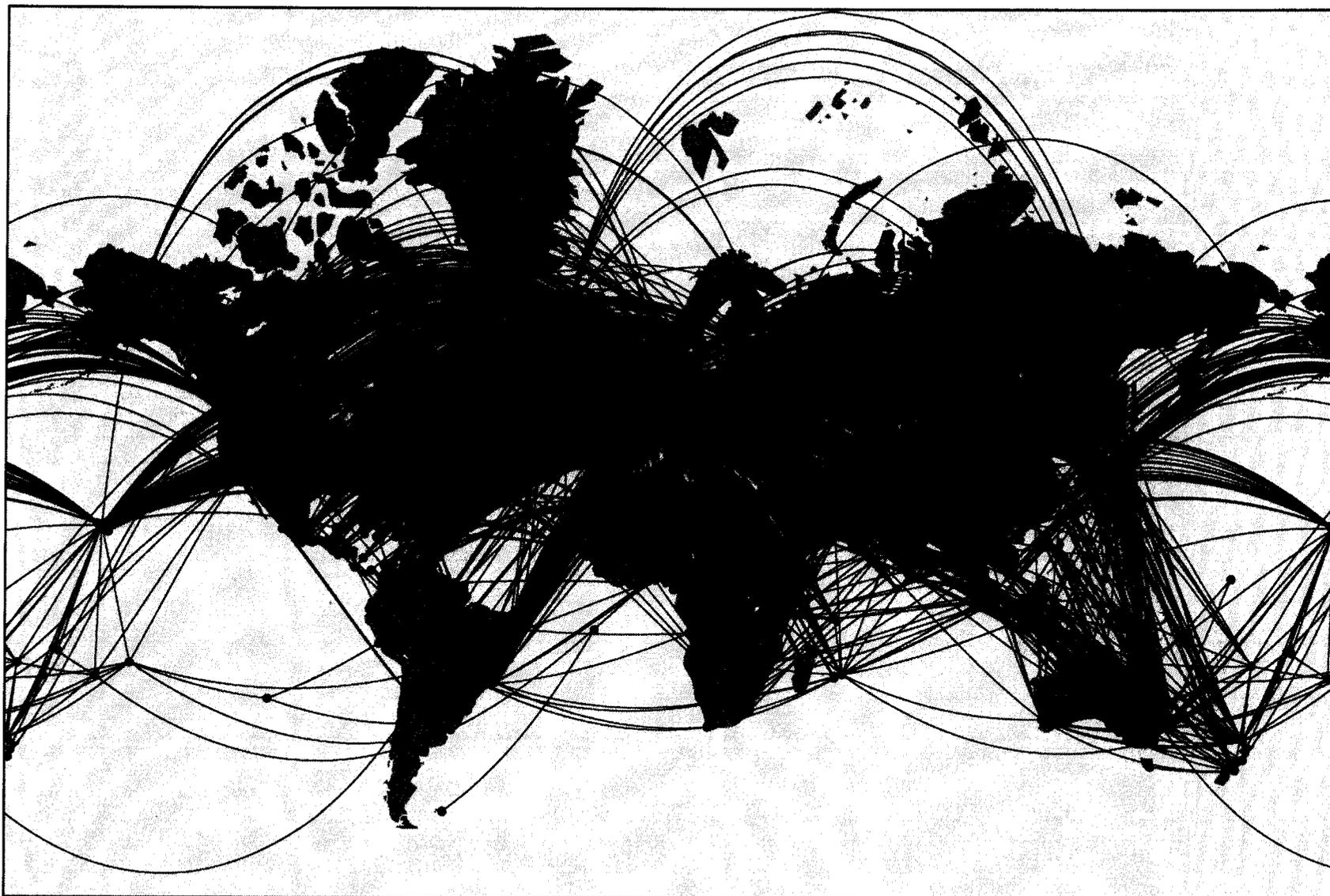


Known 767 ETOPS flights for the month of March: 16,806

Cumulative total of known 767 ETOPS Flights: 2,613,548

# The 767 Is Used Extensively For ETOPS Worldwide

*Through March 2006*

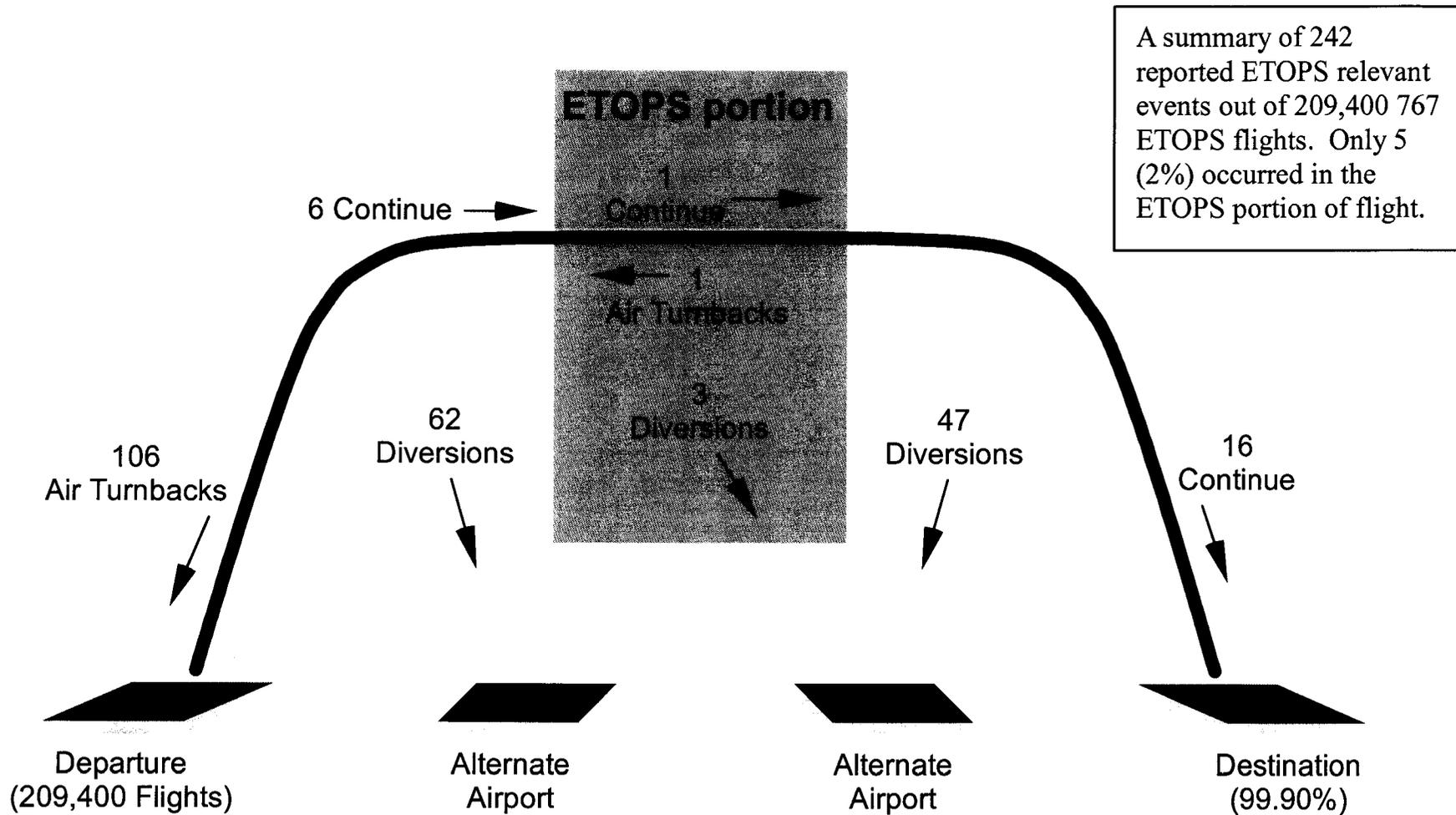


• 60% of the 767 operators are ETOPS operators.

767-ET-0003-ppt  
6-20-6-DH/KW/CJ

# 767 ETOPS Events Are Rare

12 Months - April 2005 through March 2006

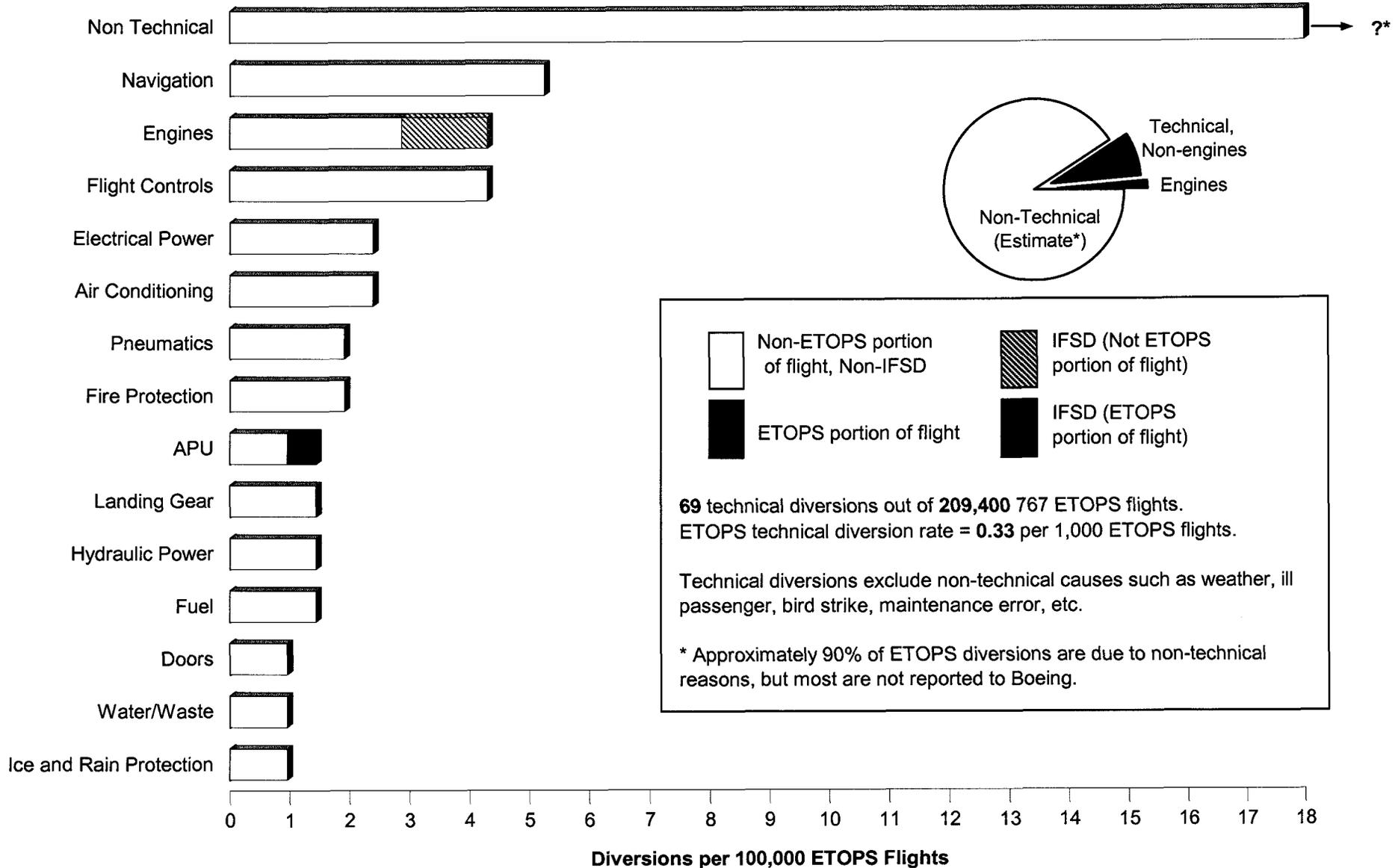


**ETOPS Events Usually Occur Outside the ETOPS Portion of Flight**

# ETOPS Diversions Are Rare and Often Have Non-Technical Causes

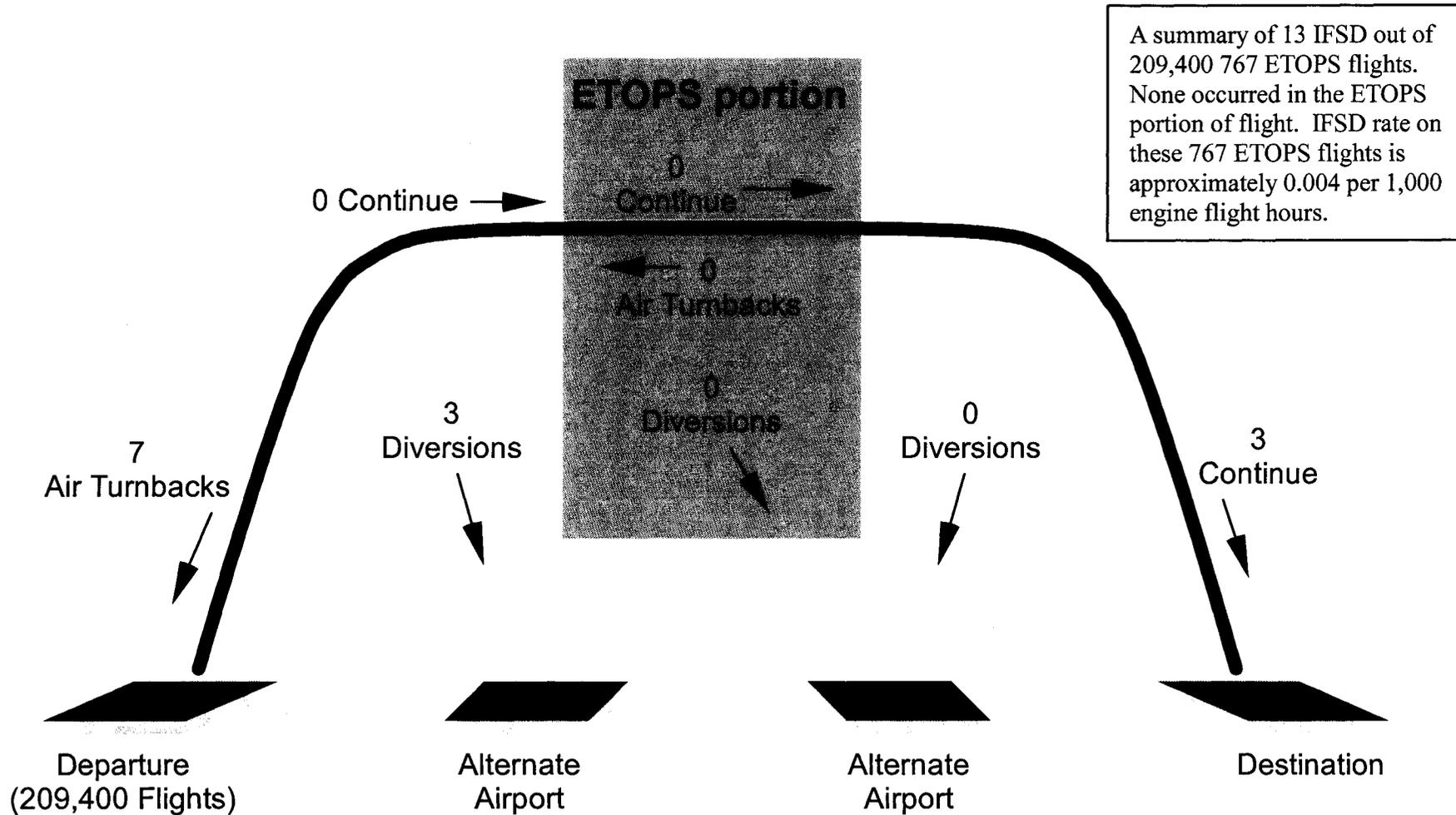
A Summary of the Top 15 Causes of 767 Diversions from ETOPS Flights

12 Months – April 2005 through March 2006



# Most 767 Inflight Shutdowns (IFSDs) Occur Outside the ETOPS Portion of Flight

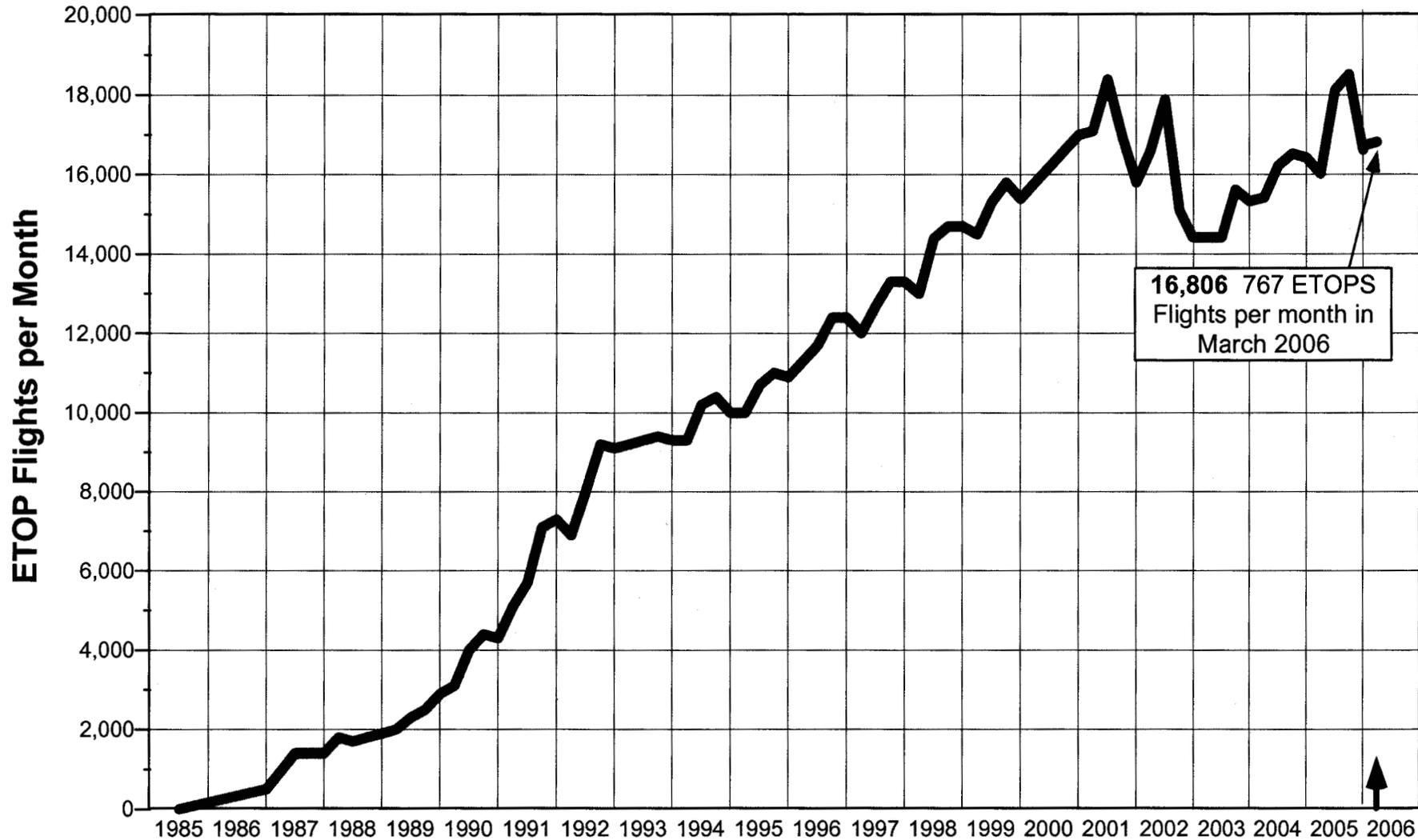
12 Months - April 2005 through March 2006



**None of the 209,400 ETOPS flights diverted from the ETOPS portion of flight due to engine IFSD.**

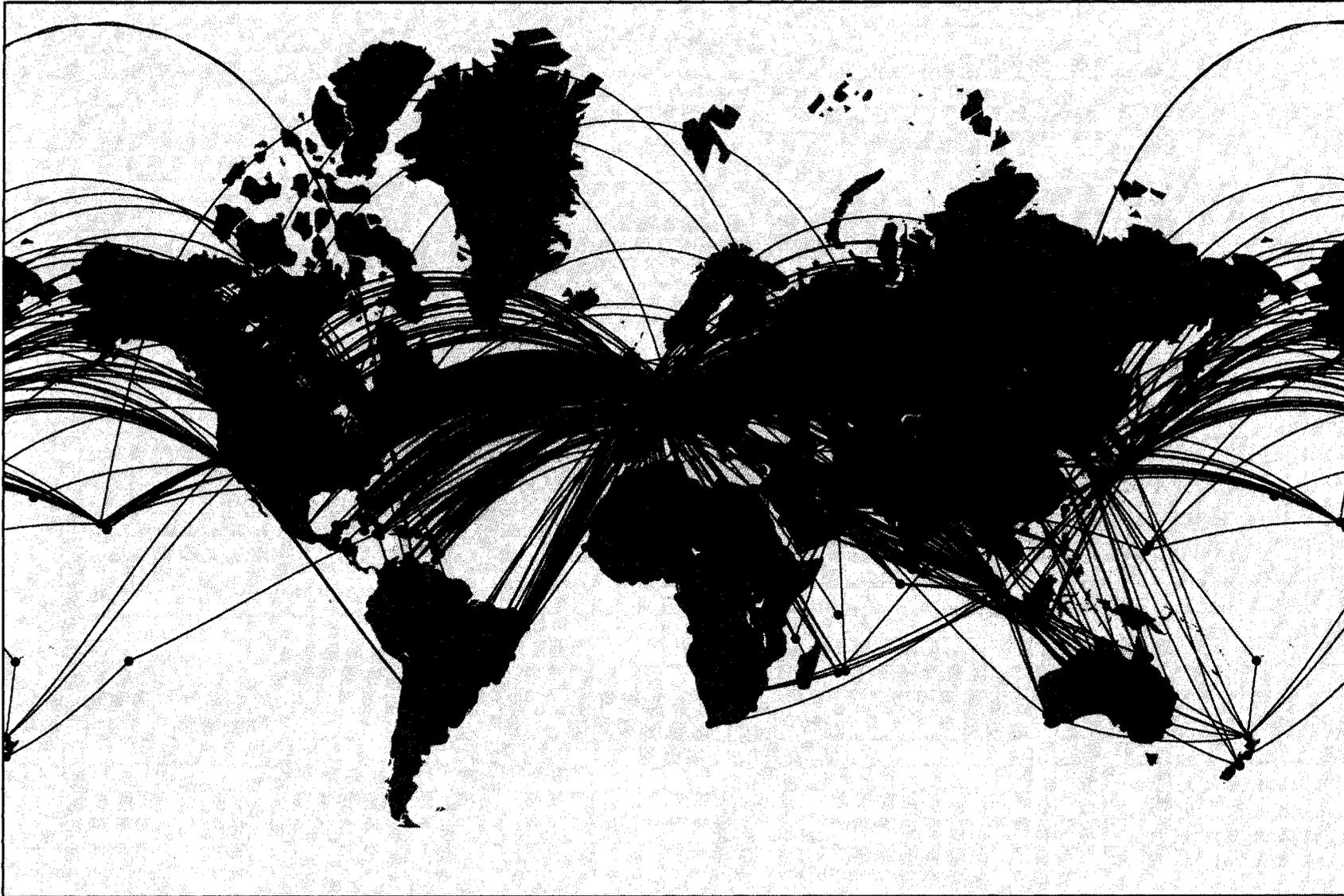
# 767 ETOPS Flights Have Grown Dramatically

*Over 500 767 ETOPS flights every day worldwide*



# The 777 Is Used Extensively For ETOPS Worldwide

*1995 Through March 2006*



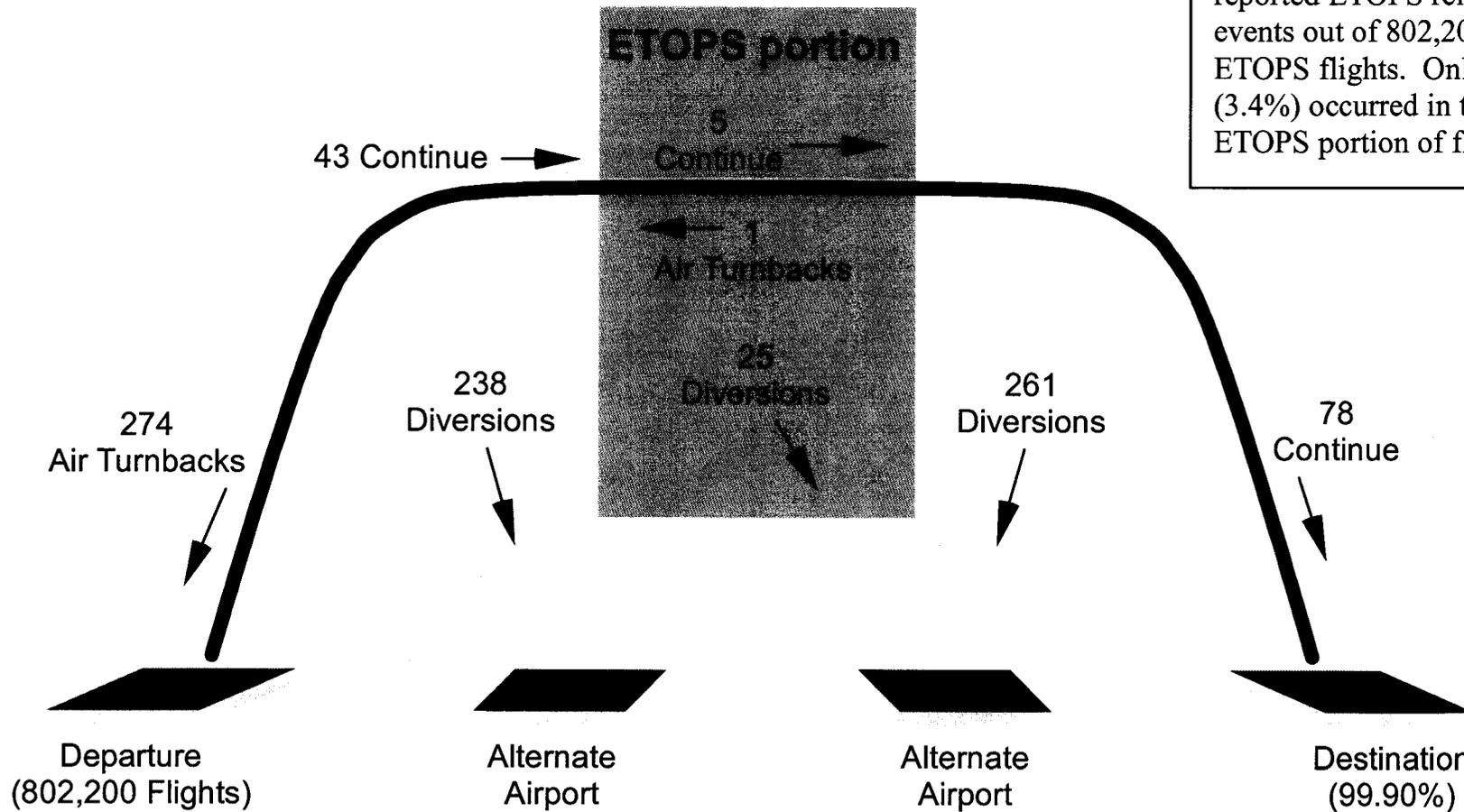
• 86% of the 777 operators are ETOPS operators.

767-ET-0053.ppt  
6-20-6-DH/KW/CJ

# 777 ETOPS Events Are Rare

June 1995 through March 2006

A summary of 925 reported ETOPS relevant events out of 802,200 777 ETOPS flights. Only 31 (3.4%) occurred in the ETOPS portion of flight.

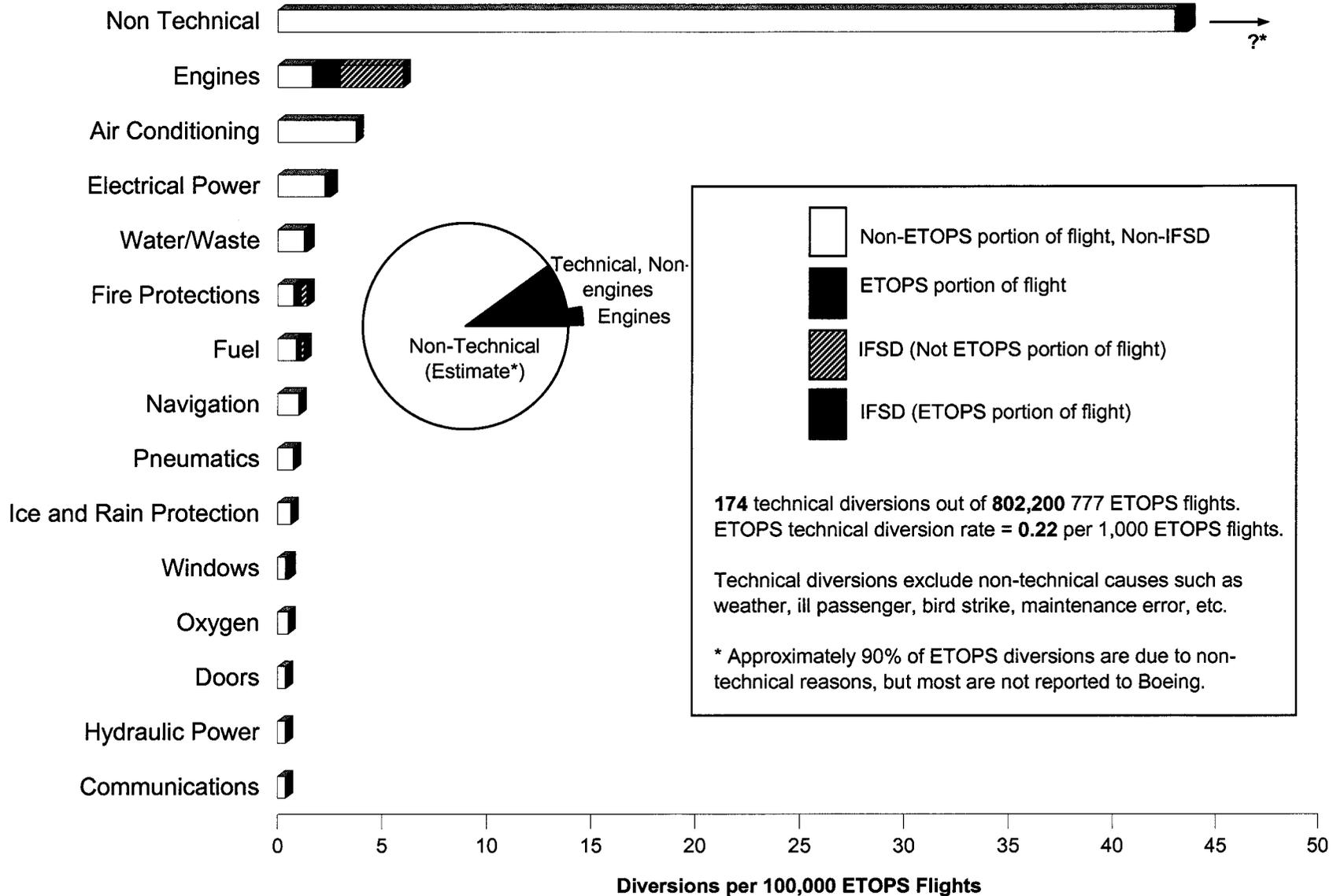


**ETOPS Events Usually Occur Outside the ETOPS Portion of Flight**

# ETOPS Diversions Are Rare and Often Have Non-Technical Causes

A Summary of the Top 15 Causes of 777 Diversions from ETOPS Flights

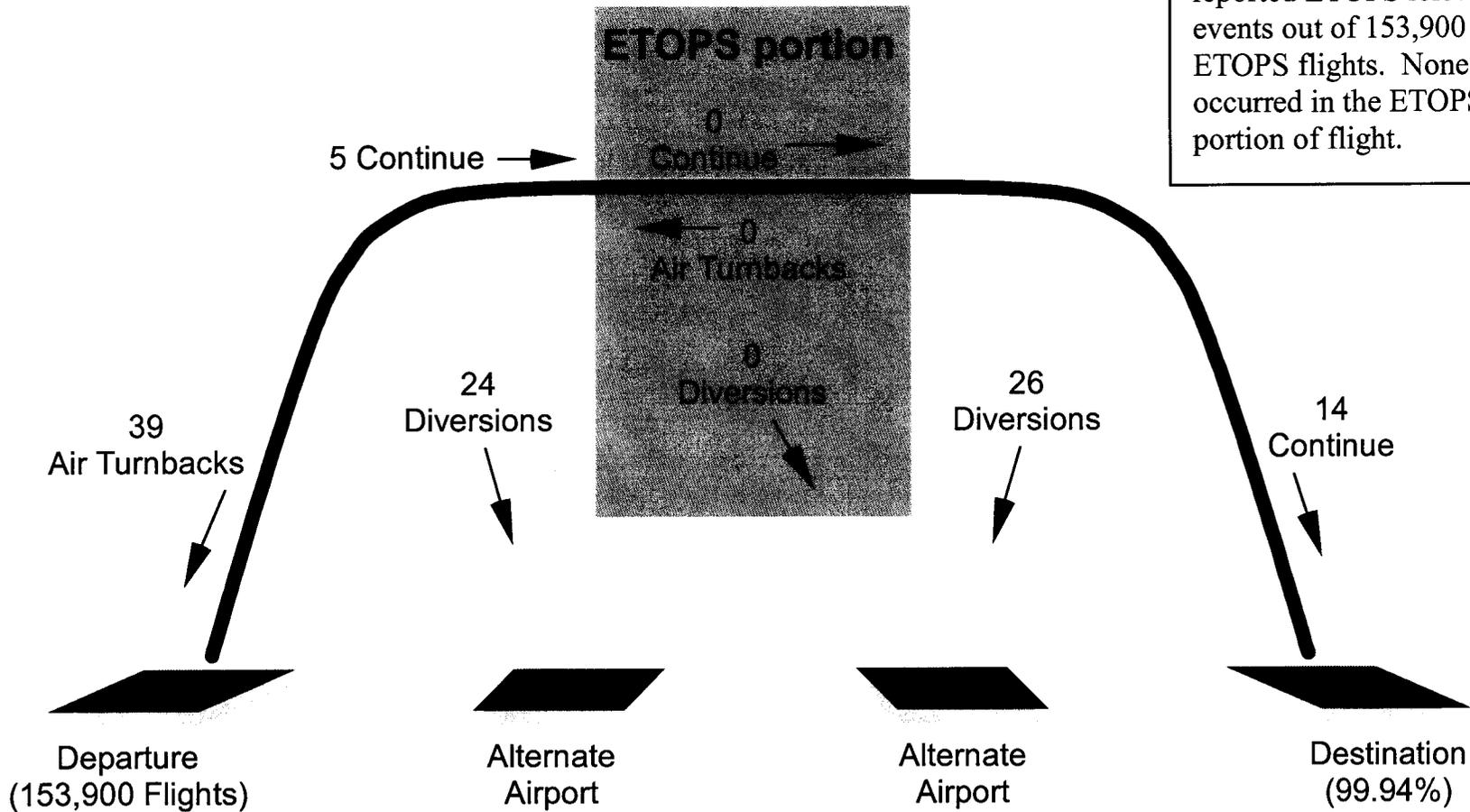
*June 1995 through March 2006*



# 777 ETOPS Events Are Rare

12 Months - April 2005 through March 2006

A summary of 108 reported ETOPS relevant events out of 153,900 777 ETOPS flights. None occurred in the ETOPS portion of flight.

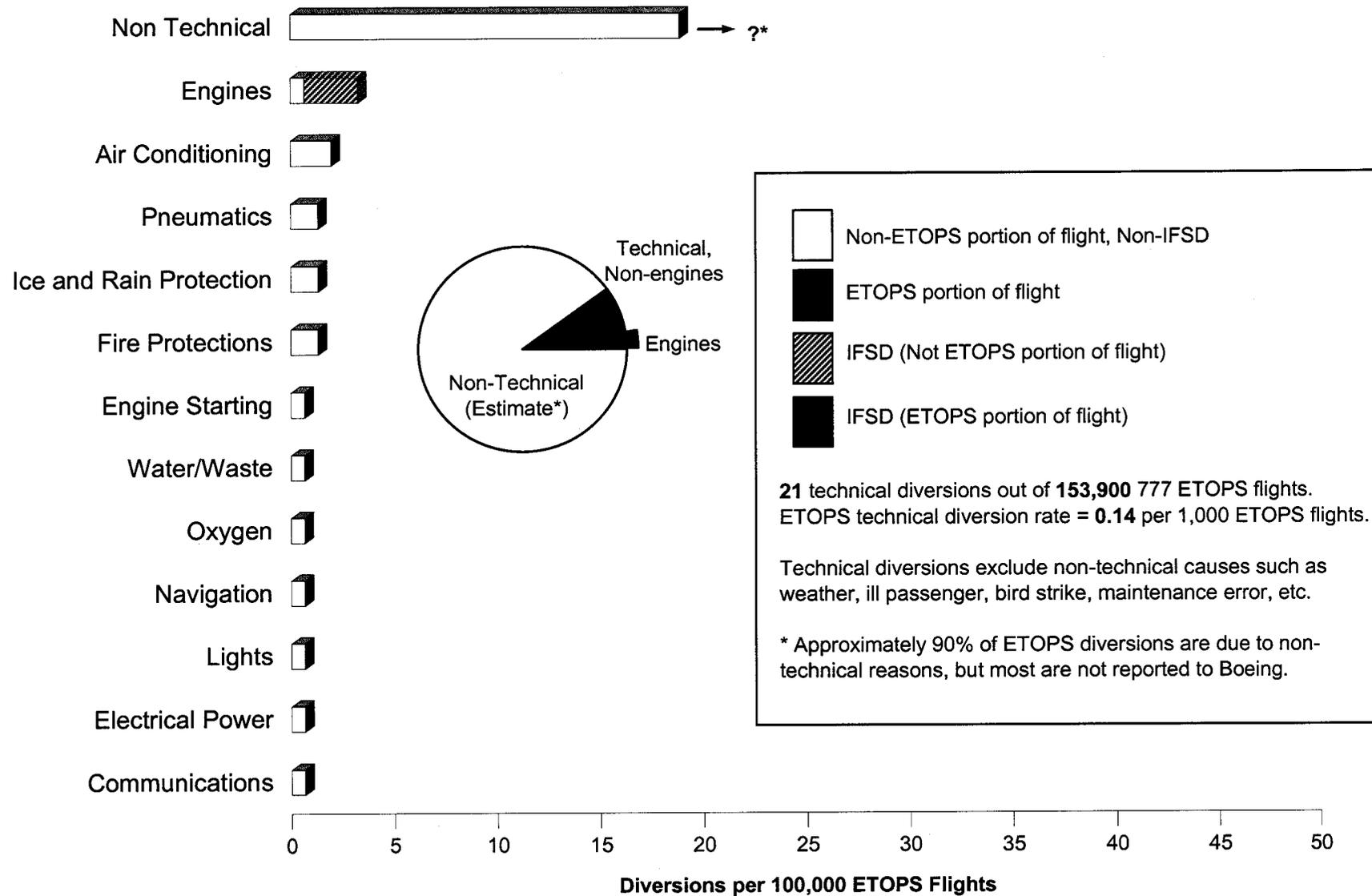


**ETOPS Events Usually Occur Outside the ETOPS Portion of Flight**

# ETOPS Diversions Are Rare and Often Have Non-Technical Causes

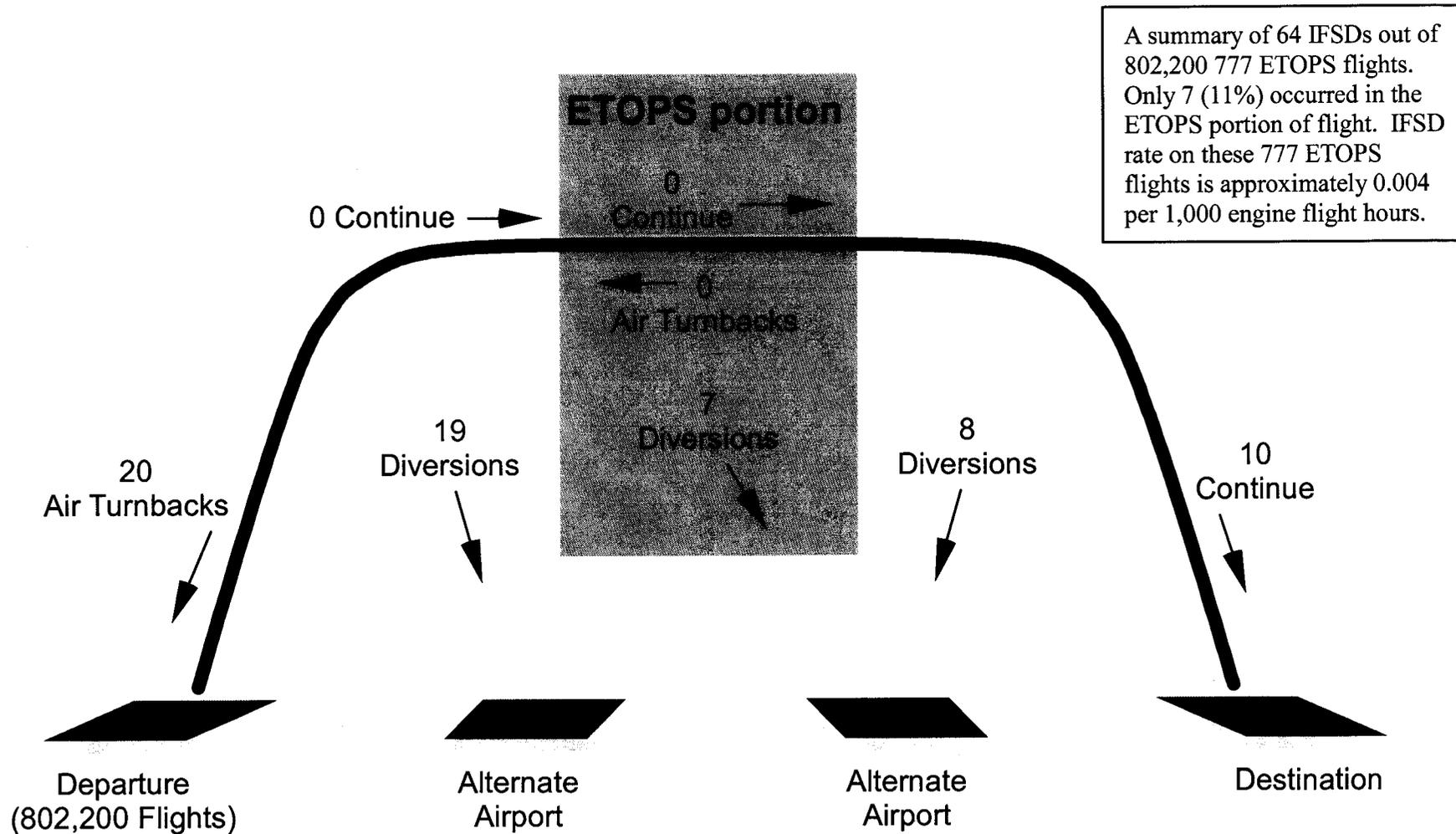
A Summary of the Causes of 777 Diversions from ETOPS Flights

12 Months – April 2005 through March 2006



# Most 777 Inflight Shutdowns (IFSDs) Occur Outside the ETOPS Portion of Flight

*June 1995 through March 2006*

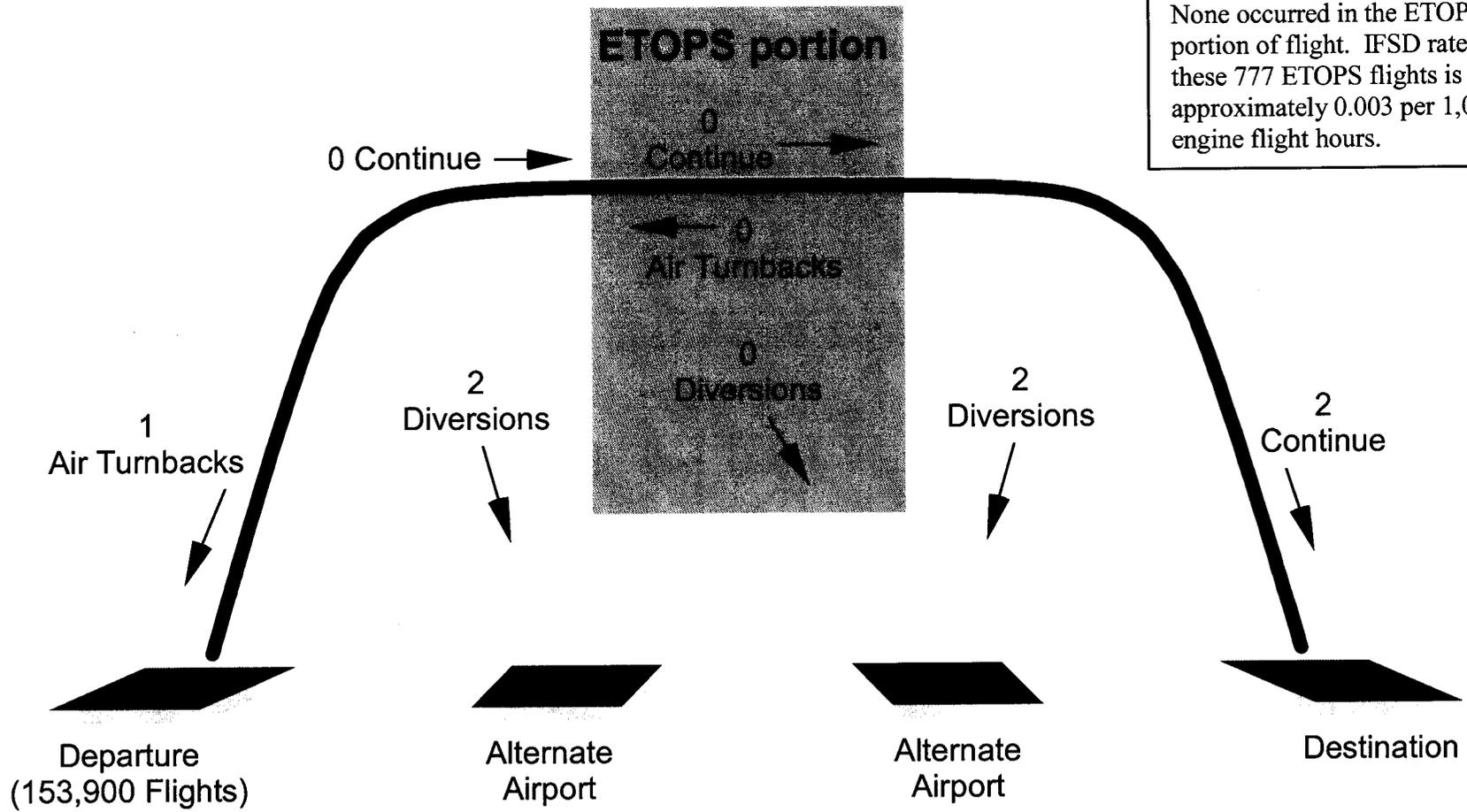


**Less than one out of 100,000 ETOPS flights diverted from the ETOPS portion of flight due to engine IFSD.**

# Most 777 Inflight Shutdowns (IFSDs) Occur Outside the ETOPS Portion of Flight

12 Months - April 2005 through March 2006

A summary of 7 IFSDs out of 153,900 777 ETOPS flights. None occurred in the ETOPS portion of flight. IFSD rate on these 777 ETOPS flights is approximately 0.003 per 1,000 engine flight hours.



None of the 153,900 ETOPS flights diverted from the ETOPS portion of flight due to engine IFSD.

# 757/767/777 ETOPS Fleet and Operations

*Summary as of March 31, 2006*

<b>Fleet total</b>	2,501
Total ETOPS-equipped airplanes	1,627
Percent of airplanes that are ETOPS-equipped	65%

<b>Operators</b>	232
ETOPS operators (sum of all models)	126
Percent of operators who use ETOPS	54%

## ETOPS use, flights per month

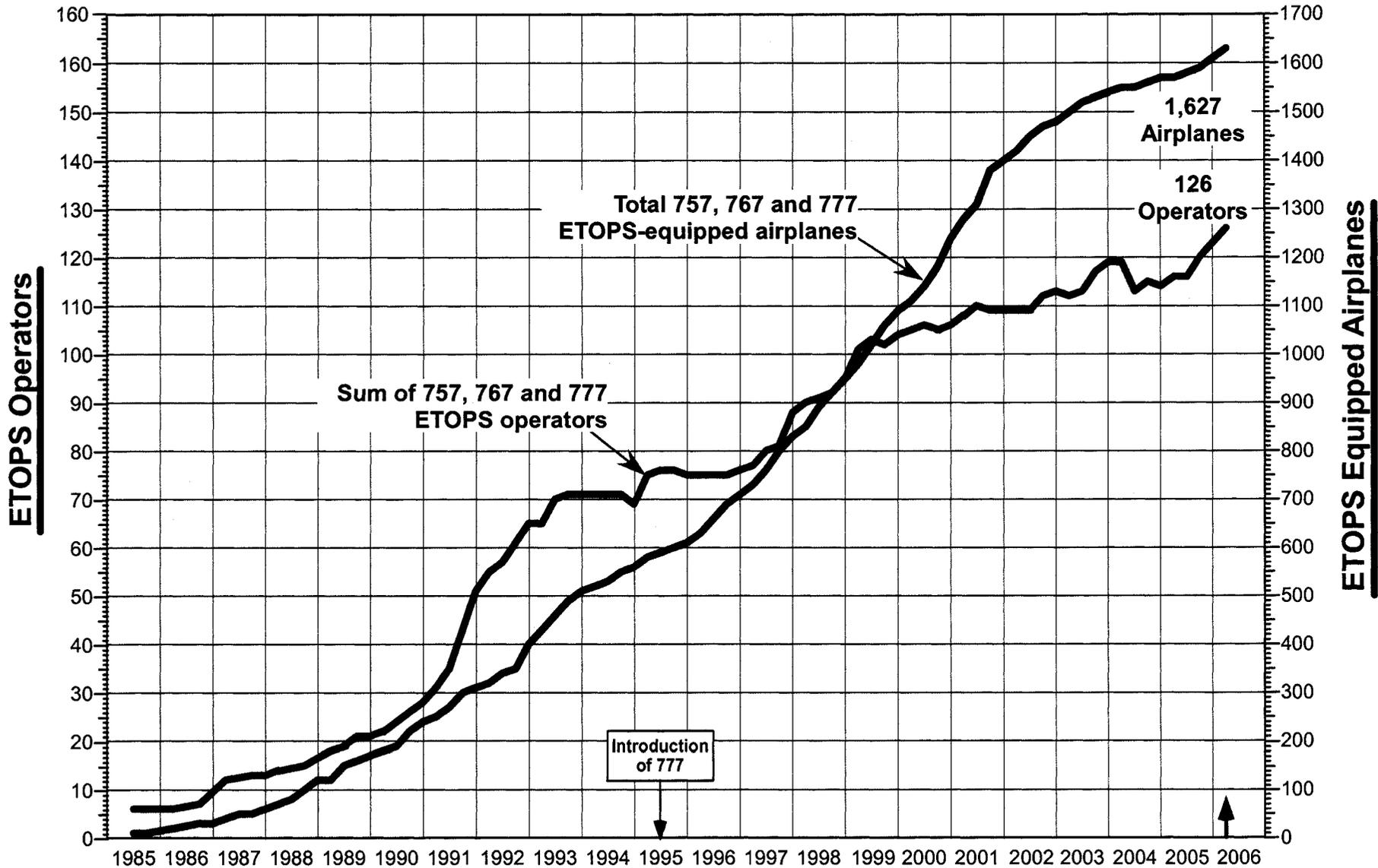
Atlantic Ocean	15,103
Pacific Ocean and Tasman Sea	10,846
Asia, Africa, and Indian Ocean	7,048
North Polar	+ 151
Total* 757, 767 & 777 ETOPS flights/month, worldwide	<u>33,148</u>

Total ETOPS flights (cumulative)	3,680,799
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\* Total of all reported 757, 767 and 777 ETOPS flights (does not include 737).

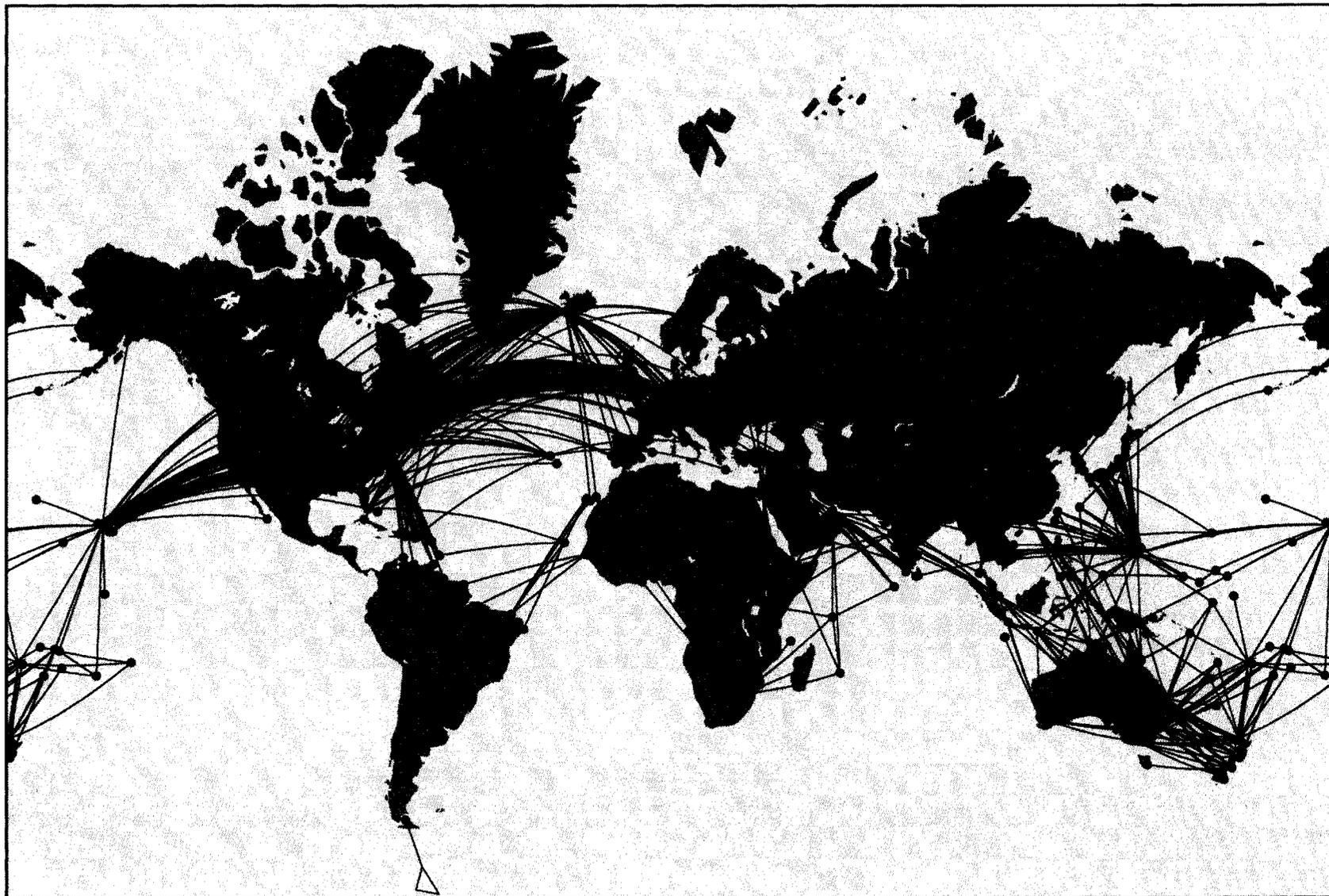
# 757, 767 and 777 ETOPS Fleet Growth

*As of March 31, 2006*



# The 737 Is Used For ETOPS in Many Parts of the World

*Through March 2006*



# ETOPS Highlights

- All four US airlines that fly the 777 on the North Pacific (AAL, CAL, DAL, UAL) as well as ANA, SIA, KAL and AAR are approved for and flying 207-minute ETOPS with 777s.
- 777 Polar routes CAL Newark - Hong Kong: 3/2001, - Beijing: 6/2005, - Delhi: 11/2005; UAL Chicago - Beijing, Shanghai: 4/2001; AAL started in April 2006 with Chicago - Shanghai, Delhi; and New York - Tokyo. (Over 5,600 777 polar flights so far) DAL, EAD, GUN & MAS have all demonstrated 777 polar flights. (747s also use polar routes.)
- Boeing airplanes have flown over 4,092,000 ETOPS flights, adding over 1,190 more per day with 112 separate ETOPS operators. (767 alone has flown 2.6 million ETOPS flights - more than all other models combined.)
- Most 767s and 777s in the air right now are on ETOPS flights (i.e. most flight hours are on ETOPS flights.)
- The 12-month ETOPS IFSD rates (ETOPS flights only) are 0.004 for 767, 0.003 for 777 and zero for 737NG.
- Boeing twins came to dominate North Atlantic routes, and are beginning to dominate the Pacific. With 447 Pacific ETOPS flights per day & rising, Pacific ETOPS flights will soon outnumber those in the Atlantic (now at 497).
- The 777-200LR with GE90-110B engines (the worlds longest range airliner with the worlds biggest engines) was certified and approved for 180-min ETOPS by both the FAA and EASA on 2 Feb. 2006. The FAA also granted it 207-minute ETOPS approval for the North Pacific the same day.
- Boeing's 787 Dreamliner will be the first airplane designed and certified under the new ETOPS rules.