

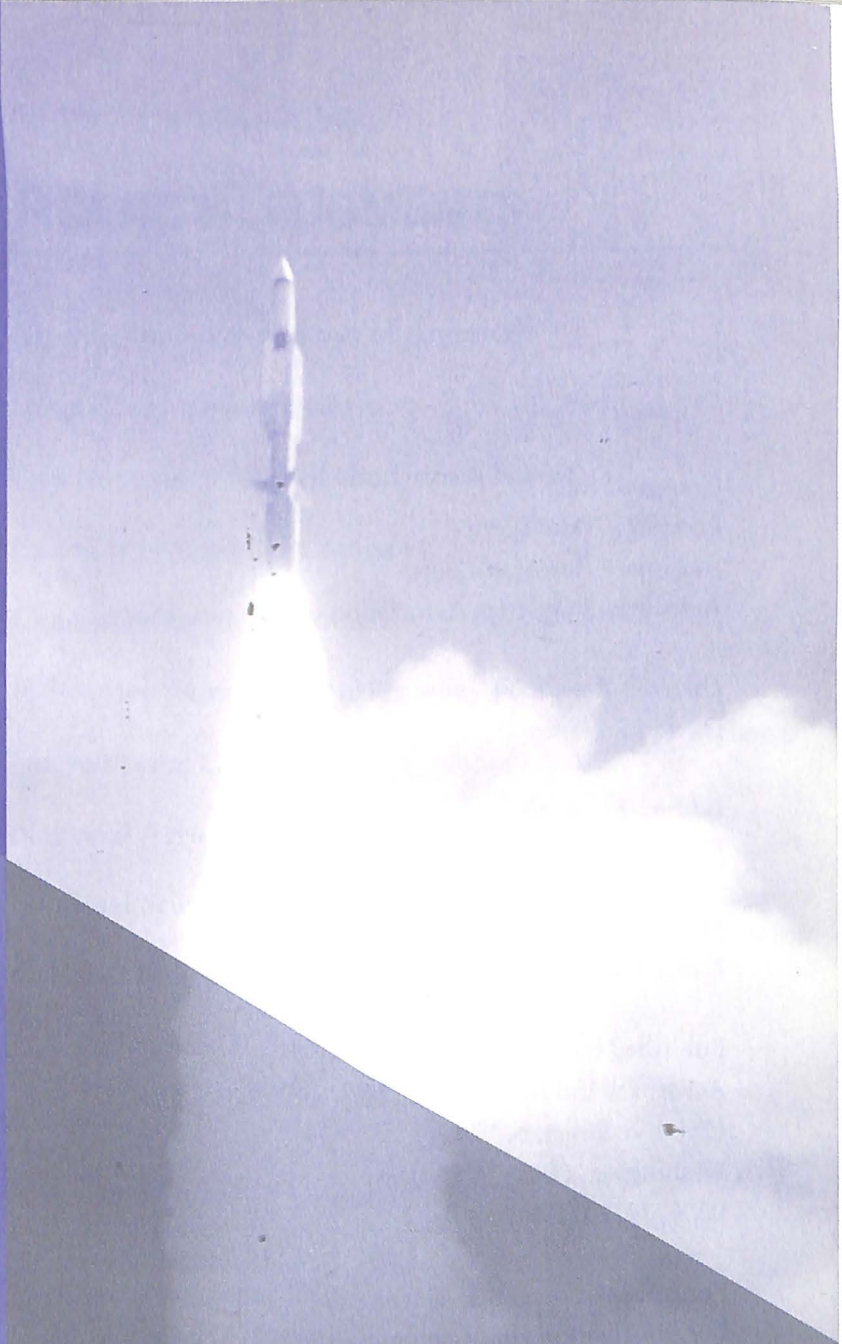
1999 2000



**AEROSPACE**

Facts and Figures

1999 2000



AEROSPACE

Facts and Figures

Compiled by:

Economic Data Service

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Published by:

Aerospace Industries Association of America, Inc.

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Washington, D.C. 20005-3924

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Library of Congress Catalog No. 46-25007

International Standard Serial No. 0898-4425

# ACKNOWLEDGMENTS

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Air Transport Association of America

Council of Economic Advisers

Export-Import Bank of the United States

Exxon International Company

General Aviation Manufacturers Association

Helicopter Association International

International Civil Aviation Organization

National Aeronautics and Space Administration

National Science Foundation

Office of Management and Budget

U.S. Department of Commerce  
(Bureau of Economic Analysis; Bureau of the Census;  
International Trade Administration)

U.S. Department of Defense  
(Air Force; Army; Ballistic Missile Defense Organization;  
Comptroller; Directorate for Information, Operations,  
and Reports; Navy)

U.S. Department of Labor  
(Bureau of Labor Statistics)

U.S. Department of Transportation  
(Federal Aviation Administration, Office of Airline Statistics)



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# FOREWORD

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The U.S. aerospace industry generated record sales, profits, and net exports in 1998—topping 1997's records. Commercial sales soared having recovered from the recession that struck the industry in the early 1990's. In other good news, manufacturers added 34,000 workers to their rolls.

Total aerospace sales increased 13% percent in 1998, reaching \$148 billion. A dramatic 28% boost in sales to non-U.S. government customers, mainly airlines, was largely responsible for this marked increase. Of special note in the 1998 sales figures is the strong market for civil transport aircraft, which accounted for 86% of the value of civil aircraft shipments. The industry delivered 559 jetliners (185 more than the previous year) for a total of \$36 billion in sales. The backlog for civil transports also increased to a total of 1,786 planes on order.

The industry's performance in international trade is also noteworthy. Aerospace exports jumped by 27%, reaching an all-time high of \$64 billion. Exports outpaced imports resulting in a positive trade balance of \$41 billion, a 27% gain over last year's record. This is even more extraordinary given the fact that the United States posted a record merchandise trade deficit of \$231 billion in 1998. The U.S. aerospace industry remains the leading net exporter of manufactured goods.

There were also signs—a projected federal budget surplus with a growing clamor against the 'Procurement Vacation'—that the long slide in defense spending has bottomed out and now is on the rise. Despite the administration's request for lower defense spending in the current budget, Congress has exercised its authority over spending by adding funding for procurement and Research, Development, Testing, and Evaluation (RDT&E). While RDT&E remains steady, defense procurement is projected to rise steadily from Fiscal Year (FY) 2001 through FY 2004.

The space market enjoyed a fourth year of steady growth, with \$32 billion in sales of space systems and services. Demand for telecommunications and the desire to bypass building a

costly, terrestrial infrastructure, fueled orders for satellites and launch services. The unfilled order backlog grew to record levels.

Despite the good news, there are several warning signs on the horizon. For example, net new orders declined for the second year in a row. New orders for military aerospace systems fell \$9 billion, bringing overall orders down 7%. Although civil orders rose by \$1.6 billion, their growth slowed to 2% from 11% in 1997. The Asian economic crisis that surfaced in late 1997 has reduced demand. This has led to postponed or canceled orders for commercial and military aircraft.

Nevertheless, the industry is well positioned to weather these storms. The industry's profit reached a record \$7.7 billion. New orders totaled \$111 billion, higher than at any time during the industry's 1992-1995 recession. The unfilled order backlog represented 1.7 years of sales. The industry business base is now broader, making it less dependent on individual programs, or on its single largest customer—the Department of Defense. Defense spending has bottomed out and is projected to grow steadily. Demand for satellites and launch services remain at record level. The economic crisis in Asia appears to be abating.

The U.S. aerospace industry manufactures high-quality products key to national defense and quality of life, invests heavily in research and development (R&D) to hone its technological edge, and battles aggressively in an increasingly competitive environment. The U.S. government must increase investment in aerospace R&D, improve access to the global market, and fight against barriers to fair competition. Working together, the U.S. government and its aerospace industry will be prepared for the economic and technological challenges ahead.



**John W. Douglass**  
President and  
Chief Executive Officer,  
Aerospace Industries  
Association



# AEROSPACE SUMMARY

The U.S. aerospace industry enjoyed a strong 12.8% overall increase in sales in 1998, surpassing 1997's gain of 12.6%. This boost was fueled by sales in the "other customers" category, which was up a remarkable 28% and includes sales to air carriers, corporations, and foreign governments. Sales in the "related products and services" category also rose 12.8%, while sales to U.S. government agencies fell 1.1%. By nearly 50%, civil aircraft sales exceeded military aircraft sales in 1998.

Here are the highlights of the industry's 1998 performance:

## Sales

Overall industry sales amounted to \$148 billion, compared with \$132 billion in 1997. U.S. government sales reached \$56 billion, down \$0.6 billion from the previous year. The "other customers" category jumped to \$68 billion in sales, up from \$53 billion in 1997.

As usual, aircraft sales led all other product groups. Sales of aircraft, engines, and parts (civil and military combined) totaled \$84 billion, compared with \$71 billion in 1997. Total aircraft sales break down into \$50 billion for civil aircraft and \$34 billion for military aircraft, with civil aircraft sales dominating military sales for the second time since 1993.

Sales of space systems grew for the fourth year in a row, reaching \$32 billion, up from \$31 billion in 1997. There was also a gain in the sales of "related products and services," where sales reached \$25 billion, up from \$22 billion the previous year. Missile systems sales declined to \$7.6 billion, down from \$8 billion.

For 1998, aerospace industry sales amounted to 1.7% of the Gross Domestic Product and 3.7% of total sales by all U.S. manufacturing industries, rising from 1.6% and 3.3% respectively in 1997.

## Earnings

Net income after taxes was \$7.7 billion, up from \$7.2 billion in the previous year. As a percentage of sales the industry's profit amounted to 5.0%, a drop from the 1997 aerospace profit-to-sales ratio of 5.2%. By comparison, the average of all U.S. manufacturing industries was 6.0%. As a percentage of assets, aerospace earnings amounted to 4.8%; as a percentage of equity, 18.0%.



The aerospace balance sheet showed net working capital of \$11.5 billion, down from \$14.2 billion in 1997. Stockholders' equity grew from \$39.3 billion in 1997 to \$43.1 billion in 1998, while total assets climbed substantially from \$150 billion to \$160 billion.

### **Orders and Backlog**

Net new orders for aerospace systems fell 6.6% to \$111 billion, down from \$119 billion in 1997, marking the second year of decline following three years of growth. The decrease was due to a drop in military orders from \$48 billion in 1997 to \$38 billion in 1998. Orders in the civil sector actually rose from \$71 billion in 1997 to \$73 billion in 1998.

The industry's backlog at year-end 1998 was \$207 billion, down from \$219 billion in the previous year. Of that, 66%, or \$137 billion, was in orders for non-military products. The backlog for military systems was \$70 billion, down from \$79 billion the previous year.

### **Civil Aircraft Production**

Data compiled by the Aerospace Industries Association (AIA) shows that U.S. manufacturers shipped 3,135 civil aircraft in 1998 with a total value of \$41.4 billion. That represents a gain of 846 units and \$9.6 billion over 1997 levels.

Civil transport production—559 aircraft valued at \$35.5 billion—accounted for 86% of the total in dollar value terms; the figures compare with 374 aircraft worth \$26.9 billion in 1997.

Production of civil helicopters jumped to its highest level since 1991, reaching 363 units (up 17) valued at \$252 million (up \$21 million).

General aviation sales increased in units to 2,213 (up 644 units) and in dollar value to \$5.6 billion (up \$1.0 billion). This sales level marked another record year for general aviation.

### **Military Aircraft Production**

The Census Bureau reported 1998 sales of complete military aircraft and parts, including engines, to be \$23.2 billion. That figure compares with \$23.9 billion in 1997.

The industry produced 419 military aircraft, 269 of them exported either through Foreign Military Sales arrangements or through direct company-to-foreign-customer sales; 150 were delivered to U.S. military agencies. The comparable figures for 1997 were 488 total, 337 exports, and 151 for the U.S. military services.

For Fiscal Year (FY) 1999, the major aircraft types procured were the Air Force C-17 Globemaster III transport, the Navy F/A-18E/F fighter, the Air Force F-22 Raptor fighter, the

Navy/Marine Corps V-22 Osprey tiltrotor aircraft, the Army AH-64 Apache helicopter, the Air Force E-8C JSTARS surveillance aircraft, the Navy E-2C Hawkeye early warning and control aircraft, and the Army UH-60 Black Hawk helicopter

### **Foreign Trade**

Continuing a turnaround that began in 1996, aerospace exports grew for a third year, reaching an all-time high of \$64 billion, up a remarkable 27% over the previous year's \$50 billion.

The aerospace trade balance also increased, as exports grew by more than double that of imports. Total imports came to \$23 billion, compared with \$18.1 billion in 1997. This resulted in a trade balance of \$41 billion, up \$8.7 billion, or 27%.

Continuing a trend, civil exports accounted for most of the 1998 volume—in excess of 80%. The civil export total of \$52 billion compares with \$40 billion in the previous year, a notable gain of 30%. The largest component of the export volume was civil transport aircraft, which at \$29 billion accounted for 56% of the civil export total. Jetliner exports were \$8.1 billion higher than in the previous year.

### **Space Programs**

Sales of space systems and services came to \$32 billion, up from \$31 billion in 1997. AIA figures include civil and military space systems and parts plus U.S. government space activities, including contracts for Research, Development, Test, and Evaluation (RDT&E).

The Census Bureau uses a reporting system that excludes launch vehicle propulsion systems, spacecraft orbital adjustment engines/motors, and RDT&E. The Bureau reported space systems sales declined in 1998 following four years of growth, with a total of \$14.0 billion, down from \$14.6 billion in the previous year. The 1998 sales figure included \$9.6 billion in non-military workload (commercial plus government-sponsored civil space) and \$4.4 billion in military work.

### **Missile Programs**

According to AIA statistics, missile sector sales declined 6% in 1998. Missile sector sales amounted to \$7.6 billion in 1998, down from \$8.0 billion in the previous year. However,



Census Bureau data (which exclude the sale of some propulsion units and RDT&E) showed a small rise in the sales of missile systems and parts to \$4 billion.

DoD outlays for missile procurement continued the steady decline that began in FY 1991, after a peak of \$14.9 billion in FY 1990 missile procurement. Missile outlays for FY 1999 totaled \$4.4 billion, down from a FY 1998 figure of \$4.9 billion. Another decrease in outlays was planned for FY 2000 (\$4.2 billion). A significant chunk of funding (\$3.3 billion will go for RDT&E programs related to ballistic missile defense rather than procurement of production-type systems. Major production programs of 1998/1999 included the Army/Marine Corps Javelin antiarmor missile, the Navy Trident II Fleet Ballistic Missile, the Army Hellfire antiarmor missile, and the Ballistic Missile Defense Organization's Patriot PAC-3 air defense system.

### **Research and Development**

In 1998 total U.S. funding for research and development (R&D) amounted to \$227 billion, up from \$212 billion in the previous year, according to the National Science Foundation (NSF). Two-thirds of the total (67%) was funded by industry (\$151 billion), which also performed the great bulk of the R&D work (75%). For 1999 NSF estimated total R&D funding at \$247 billion, indicating that industry would again be the principal funding source (69%) and performer (76%).

In 1997 (the latest year for which NSF data were available by industry), aerospace R&D funding amounted to \$16.3 billion, an increase of less than 1% over the previous year. The aerospace investment in R&D (federal and company funds) amounted to 11.2% of net sales, down from 12.9% in the previous year. Company funding as a percentage of net sales was 3.9%; the average for all U.S. manufacturing industries was 3.3%.

### **Employment**

Employment in the aerospace industry saw its second significant increase since 1989. On an annual average employment basis, the industry's labor force grew by 34,000 workers, reaching a total of 893,000. The 1998 employment figure represented 4.8% of the total employment in all U.S. manufacturing industries. The aerospace workforce also represented 8.0% of total employment by U.S. companies engaged in production of durable goods.

**STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY**

<p><b>3721 AIRCRAFT</b>                      37211 Military aircraft                      37215 Civilian aircraft                      37217 Modification, conversion, and overhaul of previously accepted aircraft                      37218 Aeronautical services on complete aircraft, nec</p> <p><b>3724 AIRCRAFT ENGINES AND ENGINE PARTS</b>                      37241 Aircraft engines for military aircraft                      37242 Aircraft engines for civilian aircraft                      37243 Aeronautical services on aircraft engines                      37244 Aircraft engine parts and accessories</p> <p><b>3728 AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC</b>                      37281 Aircraft parts and auxiliary equipment, nec                      37282 Aircraft propellers and helicopter rotors                      37283 Research and development on aircraft parts</p> <p><b>3761 GUIDED MISSILES AND SPACE VEHICLES</b>                      37611 Complete guided missiles (excluding propulsion systems)                      37612 Complete space vehicles (excluding propulsion systems)                      37613 Research and development on complete guided missiles                      37614 Research and development on complete space vehicles                      37615 All other services on complete guided missiles and space vehicles</p> <p><b>3663 RADIO AND TELEVISION COMMUNICATIONS EQUIPMENT</b>                      36631 Communication systems and equipment, except broadcast</p>	<p><b>3764 SPACE PROPULSION UNITS AND PARTS</b>                      37645 Complete missile or space vehicle engines and/or propulsion units                      37646 Research and development on complete missile or space vehicle engines and/or propulsion units                      37647 Services on complete guided missile or space vehicle engines and/or propulsion units, nec                      37648 Missile and space vehicle engine and/or propulsion unit parts and accessories</p> <p><b>3769 SPACE VEHICLE EQUIPMENT, NEC</b>                      37692 Missile and space vehicle components, parts and subassemblies, nec                      37694 Research and development on missile and space vehicle parts and components, nec</p> <p><b>3669 COMMUNICATIONS EQUIPMENT, NEC</b>                      36691 Alarm systems                      36692 Traffic control equipment                      36693 Intercommunication equipment</p> <p><b>3812 SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL AND NAUTICAL SYSTEMS, INSTRUMENTS, AND EQUIPMENT</b>                      38121 Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals                      38122 Search, detection, navigation, and guidance systems and equipment</p> <p><b>3829 MEASURING AND CONTROLLING DEVICES, NEC</b>                      38291 Aircraft engine instruments, except flight</p>
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Source: Office of Management and Budget, "Standard Industrial Classification Manual, 1987."

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC: Not elsewhere classified.



## AEROSPACE INDUSTRY SALES BY CUSTOMER

Calendar Years 1984-1998

(Millions of Dollars)

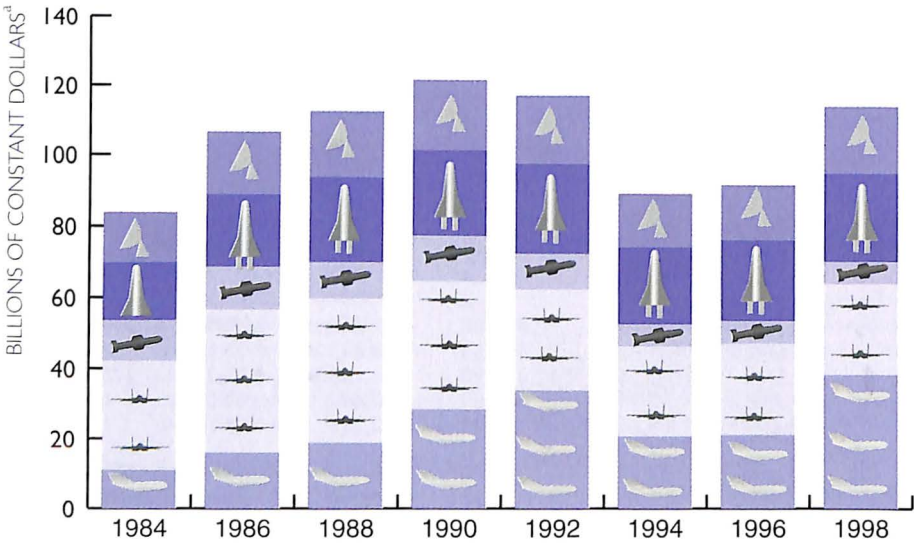
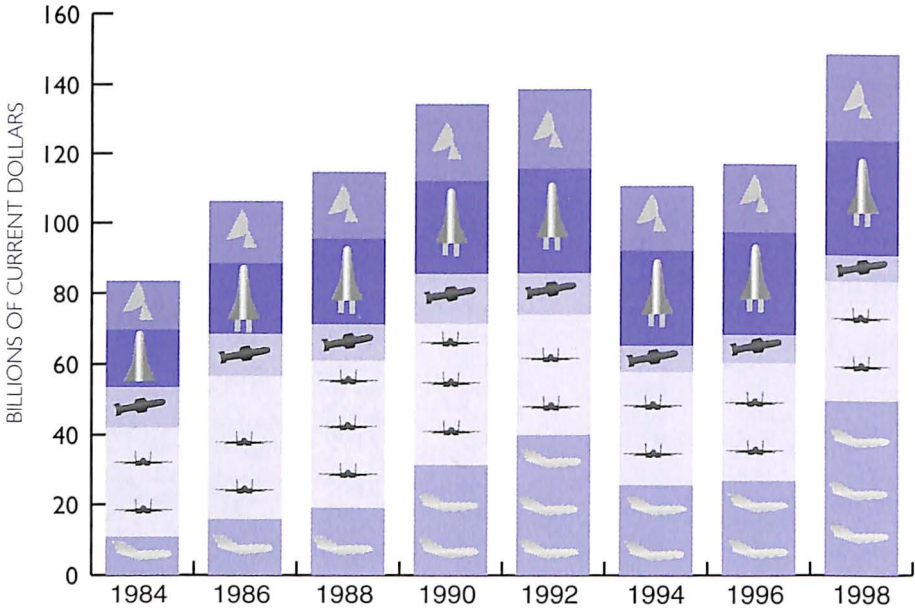
Year	TOTAL SALES	Aerospace Products and Services				Related Products and Services
		Total	U.S. Government		Other Customers	
			Dept. of Defense	NASA and Other Agencies		
<b>CURRENT DOLLARS</b>						
1984	\$ 83,486	\$ 69,572	\$45,969	\$ 6,063	\$17,540	\$13,914
1985	96,571	80,476	53,178	6,262	21,036	16,095
1986	106,183	88,486	59,161	6,236	23,089	17,697
1987	110,008	91,673	61,817	6,813	23,043	18,335
1988	114,562	95,468	61,327	7,899	26,242	19,094
1989	120,534	100,445	61,199	9,601	29,645	20,089
1990	134,375	111,979	60,502	11,097	40,379	22,396
1991	139,248	116,040	55,922	11,739	48,379	23,208
1992	138,591	115,493	52,202	12,408	50,882	23,099
1993	123,183	102,653	47,017	12,255	43,380	20,531
1994	110,558	92,132	43,795	11,932	36,405	18,426
1995	107,782	89,818	42,401	11,413	36,004	17,964
1996 <sup>f</sup>	116,812	97,344	42,535	12,391	42,418	19,469
1997 <sup>f</sup>	131,584	109,653	43,702	12,755	53,196	21,931
1998	148,490	123,741	42,518	13,299	67,925	24,748
<b>CONSTANT DOLLARS<sup>a</sup></b>						
1984	\$ 83,653	\$ 69,711	\$46,061	\$ 6,075	\$17,575	\$13,942
1985	97,843	81,536	53,878	6,344	21,313	16,307
1986	106,396	88,663	59,280	6,248	23,135	17,732
1987	110,008	91,673	61,817	6,813	23,043	18,335
1988	112,426	93,688	60,184	7,752	25,753	18,738
1989	113,604	94,670	57,680	9,049	27,941	18,934
1990	121,606	101,338	54,753	10,043	36,542	20,268
1991	121,508	101,257	48,798	10,243	42,216	20,251
1992	117,251	97,710	44,164	10,497	43,047	19,542
1993	101,636	84,697	38,793	10,111	35,792	16,940
1994	89,304	74,420	35,376	9,638	29,406	14,884
1995	85,745	71,454	33,732	9,080	28,643	14,291
1996 <sup>f</sup>	91,689	76,408	33,387	9,726	33,295	15,282
1997 <sup>f</sup>	101,218	84,348	33,617	9,812	40,920	16,870
1998	113,785	94,821	32,581	10,191	52,050	18,964

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," "Other Customers," and "Related Products and Services."

<sup>a</sup> Based on AIA's aerospace composite price deflator, 1987=100.<sup>f</sup> Revised.

# AEROSPACE SALES BY PRODUCT GROUP



CIVIL AIRCRAFT



MILITARY AIRCRAFT



MISSILES



SPACE



RELATED PRODUCTS AND SERVICES

SOURCE: AEROSPACE INDUSTRIES ASSOCIATION

<sup>a</sup> BASED ON AIA'S COMPOSITE PRICE DEFLATOR (1987 = 100)

## AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

Calendar Years 1984–1998

(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Related Products & Services
		Total	Civil	Military			
<b>CURRENT DOLLARS</b>							
1984	\$ 83,486	\$41,905	\$10,690	\$31,215	\$11,335	\$16,332	\$13,914
1985	96,571	50,482	13,730	36,752	11,438	18,556	16,095
1986	106,183	56,405	15,718	40,687	11,964	20,117	17,697
1987	110,008	59,188	15,465	43,723	10,219	22,266	18,335
1988	114,562	60,886	19,019	41,867	10,270	24,312	19,094
1989	120,534	61,550	21,903	39,646	13,622	25,274	20,089
1990	134,375	71,353	31,262	40,091	14,180	26,446	22,396
1991	139,248	75,918	37,443	38,475	10,970	29,152	23,208
1992	138,591	73,905	39,897	34,008	11,757	29,831	23,099
1993	123,183	65,829	33,116	32,713	8,451	28,372	20,531
1994	110,558	57,648	25,596	32,052	7,563	26,921	18,426
1995	107,782	55,048	23,965	31,082	7,386	27,385	17,964
1996 <sup>r</sup>	116,812	60,296	26,869	33,427	8,008	29,040	19,469
1997 <sup>r</sup>	131,584	70,804	37,428	33,376	8,037	30,812	21,931
1998	148,490	83,882	49,815	34,067	7,574	32,285	24,748
<b>CONSTANT DOLLARS<sup>a</sup></b>							
1984	\$ 83,653	\$41,989	\$10,711	\$31,278	\$11,358	\$16,365	\$13,942
1985	97,843	51,147	13,911	37,236	11,589	18,800	16,307
1986	106,396	56,518	15,749	40,769	11,988	20,157	17,732
1987	110,008	59,188	15,465	43,723	10,219	22,266	18,335
1988	112,426	59,751	18,664	41,086	10,079	23,859	18,738
1989	113,604	58,011	20,644	37,367	12,839	23,821	18,934
1990	121,606	64,573	28,291	36,281	12,833	23,933	20,268
1991	121,508	66,246	32,673	33,573	9,572	25,438	20,251
1992	117,251	62,525	33,754	28,772	9,947	25,238	19,542
1993	101,636	54,314	27,323	26,991	6,973	23,409	16,940
1994	89,304	46,565	20,675	25,890	6,109	21,746	14,884
1995	85,745	43,793	19,065	24,727	5,876	21,786	14,291
1996 <sup>r</sup>	91,689	47,328	21,090	26,238	6,286	22,794	15,282
1997 <sup>r</sup>	101,218	54,465	28,791	25,674	6,182	23,702	16,870
1998	113,785	64,277	38,172	26,105	5,804	24,739	18,964

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Industry," "Aerospace Sales," "Other Customers," and "Related Products and Services."

a Based on AIA's aerospace composite deflator, 1987=100.

r Revised.

**SALES OF MAJOR AEROSPACE COMPANIES  
AS REPORTED BY THE BUREAU OF THE CENSUS**

Calendar Years 1984–1998  
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, & Parts		Missiles, Space, & Rocket Propulsion	Other Aerospace		Non-Aerospace
		Military	Non-Mil.	Military	Non-Mil.		Military	Non-Mil.	
<b>CURRENT DOLLARS</b>									
1984	\$ 88,941	\$57,047	\$31,894	\$23,268	\$14,017	\$13,624	\$12,245	\$3,257	\$22,530
1985	100,522	65,098	35,424	25,758	18,182	16,741	14,491	3,675	21,675
1986	105,577	68,303	37,274	27,043	20,714	17,535	16,287	3,520	20,478
1987	110,301	70,194	40,107	27,806	21,256	20,715	15,786	3,429	21,309
1988	113,548	69,448	44,100	25,068	25,674	21,514	16,382	2,946	21,964
1989	122,148	71,647	50,501	24,287	29,538	22,643	16,908	3,605	25,167
1990	136,646	73,616	63,030	27,667	38,622	22,040	15,773	4,342	28,202
1991	123,862	67,089	56,773	25,385	43,155	23,311	13,472	4,281	14,258
1992	118,736	61,410	57,326	23,509	44,160	21,349	12,153	3,377	14,188
1993	109,926	56,102	53,824	20,099	40,987	18,134	11,936	3,592	15,178
1994	104,296	58,012	46,284	23,652	30,901	18,406	11,981	4,417	14,939
1995	102,797	52,476	50,321	22,944	32,085	18,366	11,921	4,462	13,019
1996	103,115	53,153	49,962	24,804	32,722	18,506	12,171	4,624	10,287
1997 <sup>f</sup>	114,946	50,648	64,298	23,944	42,614	21,354	12,320	3,922	10,792
1998	120,682	44,918	75,764	23,184	52,505	20,702	9,024	5,023	10,244
<b>CONSTANT DOLLARS <sup>a</sup></b>									
1984	\$ 89,119	\$57,161	\$31,958	\$23,315	\$14,405	\$13,651	\$12,270	\$3,264	\$22,575
1985	101,846	65,955	35,891	26,097	18,421	16,961	14,682	3,723	21,960
1986	105,789	68,440	37,349	27,097	20,756	17,570	16,320	3,527	20,519
1987	110,301	70,194	40,107	27,806	21,256	20,715	15,786	3,429	21,309
1988	111,431	68,153	43,278	24,601	25,195	21,113	16,077	2,891	21,554
1989	115,125	67,528	47,598	22,891	27,841	21,341	15,936	3,398	23,720
1990	123,662	66,621	57,041	25,038	34,952	19,946	14,274	3,929	25,522
1991	108,082	58,542	49,540	22,151	37,657	20,341	11,756	3,736	12,442
1992	100,453	51,954	48,499	19,889	37,360	18,062	10,282	2,857	12,003
1993	90,698	46,289	44,409	16,583	33,818	14,962	9,848	2,964	12,523
1994	84,246	46,859	37,386	19,105	24,960	14,868	9,678	3,568	12,067
1995	81,780	41,747	40,033	18,253	25,525	14,611	9,484	3,550	10,357
1996	80,938	41,721	39,217	19,469	25,684	14,526	9,553	3,630	8,075
1997 <sup>f</sup>	88,420	38,960	49,460	18,418	32,780	16,426	9,477	3,017	8,302
1998	92,477	34,420	58,057	17,766	40,234	15,864	6,915	3,849	7,850

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

<sup>a</sup> Based on AIA's aerospace composite price deflator, 1987=100.

<sup>f</sup> Revised.



## ORDERS AND BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1984–1998  
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, En- gines, & Parts		Missiles, Space, & Rocket Propul- sion	Other Aerospace		Non- Aero- space
		Mili- tary	Non- Mil.	Mili- tary	Non- Mil.		Mili- tary	Non- Mil.	
<b>NET NEW ORDERS</b>									
1984	\$104,863	\$ 69,654	\$ 35,209	\$29,894	\$ 17,208	\$16,485	\$13,673	\$3,838	\$23,765
1985	110,968	70,978	39,990	28,201	21,471	20,328	14,488	3,042	23,168
1986	110,836	70,132	40,704	24,124	23,833	20,445	16,836	3,510	22,088
1987	121,224	67,594	53,630	19,347	33,000	26,272	14,178	4,379	24,048
1988	147,128	69,209	77,919	24,242	57,906	20,240	18,423	3,044	23,273
1989	173,635	79,992	93,643	28,818	67,773	26,820	17,814	3,945	28,465
1990	145,965	56,405	89,560	17,735	64,651	20,207	12,945	3,556	26,871
1991	122,485	63,017	59,468	26,675	40,815	24,955	11,329	4,360	14,351
1992	100,306	57,383	42,923	19,631	30,110	22,849	11,201	3,256	13,259
1993	79,770	49,541	30,229	19,518	16,090	14,919	11,121	4,629	13,493
1994	88,706	53,268	35,438	23,352	20,166	13,705	12,924	5,395	13,164
1995	109,109	49,350	59,759	19,854	36,467	19,181	13,716	5,261	14,630
1996	126,267	62,127	64,140	25,343	45,281	27,067	12,136	5,070	11,370
1997 <sup>f</sup>	118,993	47,802	71,192	21,424	49,676	21,326	12,348	4,125	10,096
1998	111,183	38,356	72,828	17,008	46,958	24,268	8,978	4,481	9,491
<b>BACKLOG AS OF DECEMBER 31</b>									
1984	\$132,507	\$ 96,364	\$ 36,143	\$45,450	\$ 24,739	\$17,823	\$19,911	\$4,271	\$20,313
1985	142,953	102,244	40,709	47,893	28,298	21,410	19,908	3,638	21,806
1986	148,212	104,073	44,139	44,974	31,417	24,320	20,457	3,628	23,416
1987	158,650	99,474	59,176	36,514	43,501	30,544	18,937	4,604	24,550
1988	191,518	99,117	92,401	35,515	75,765	29,078	20,584	4,734	25,842
1989	252,401	114,070	138,331	44,026	115,124	33,771	24,186	7,652	27,642
1990	250,079	88,471	161,608	33,788	139,152	31,648	18,501	4,999	21,991
1991	245,241	89,517	155,724	39,149	134,527	32,657	17,213	4,907	16,788
1992	236,076	92,139	143,937	44,255	124,322	32,933	14,886	4,859	14,821
1993	211,814	91,751	120,063	46,177	96,228	29,511	16,668	7,958	15,272
1994	192,561	84,445	108,116	44,624	85,305	24,746	15,599	8,043	14,244
1995	202,638	82,309	120,329	44,642	92,239	27,113	17,534	8,214	12,906
1996	229,871	89,500	140,371	47,635	106,341	35,440	16,176	9,339	14,940
1997 <sup>f</sup>	218,993	78,870	140,082	43,615	111,931	34,585	12,125	4,754	11,942
1998	206,571	70,039	136,532	37,028	105,875	36,797	11,451	3,921	11,498

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).  
r Revised.

## AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1984–1998  
(Billions of Dollars)

Year	Gross Domestic Product	Industry Sales			Aerospace Sales As Percent of			
		Manufacturing	Durable Goods	Aerospace	GDP	Manufacturing	Durable Goods	
<b>CURRENT DOLLARS</b>								
1984	\$3,902.4	\$2,288.2	\$1,175.3	\$ 83.5	2.1 %	3.6 %	7.1 %	
1985	4,180.7	2,334.5	1,215.3	96.6	2.3	4.1	7.9	
1986	4,422.2	2,335.9	1,238.9	106.2	2.4	4.5	8.6	
1987	4,692.3	2,475.9	1,297.5	110.0	2.3	4.4	8.5	
1988	5,049.6	2,695.4	1,421.5	114.6	2.3	4.3	8.1	
1989	5,438.7	2,840.4	1,477.9	120.5	2.2	4.2	8.2	
1990	5,743.8	2,912.2	1,485.3	134.4	2.3	4.6	9.0	
1991	5,916.7	2,878.2	1,452.0	139.2	2.4	4.8	9.6	
1992	6,244.4	3,004.7	1,541.9	138.6	2.2	4.6	9.0	
1993	6,558.1	3,127.6	1,630.6	123.2	1.9	3.9	7.6	
1994	6,947.0	3,348.0	1,789.6	110.6	1.6	3.3	6.2	
1995	7,269.6	3,594.7	1,927.0	107.8	1.5	3.0	5.6	
1996	7,661.6	3,715.5	2,004.2	116.8	1.5	3.1	5.8	
1997 <sup>r</sup>	8,110.9	3,929.4	2,158.7	131.6	1.6	3.3	6.1	
1998	8,511.0	4,052.2	2,276.0	148.5	1.7	3.7	6.5	
<b>CONSTANT DOLLARS<sup>a</sup></b>								
					<b>Real Annual Growth<sup>b</sup></b>			
					<b>GDP</b>	<b>Mfg.</b>	<b>Durs.</b>	<b>Aero.</b>
1984	\$5,140.1	\$3,013.9	\$1,548.1	\$ 83.7	7.0%	6.5 %	10.4 %	(3.6)%
1985	5,323.7	2,972.7	1,547.6	97.8	3.6	(1.4)	(0.0)	17.0
1986	5,488.0	2,898.8	1,537.4	106.4	3.1	(2.5)	(0.7)	8.7
1987	5,649.3	2,980.9	1,562.2	110.0	2.9	2.8	1.6	3.4
1988	5,864.8	3,130.6	1,651.0	112.4	3.8	5.0	5.7	2.2
1989	6,061.9	3,165.8	1,647.2	113.6	3.4	1.1	(0.2)	1.0
1990	6,133.9	3,110.0	1,586.2	121.6	1.2	(1.8)	(3.7)	7.0
1991	6,079.6	2,957.4	1,492.0	121.5	(0.9)	(4.9)	(5.9)	(0.1)
1992	6,244.4	3,004.7	1,541.9	117.3	2.7	1.6	3.3	(3.5)
1993	6,389.4	3,047.2	1,588.7	101.6	2.3	1.4	3.0	(13.3)
1994	6,610.5	3,185.9	1,702.9	89.3	3.5	4.6	7.2	(12.1)
1995 <sup>r</sup>	6,762.4	3,343.9	1,792.6	85.7	2.3	5.0	5.3	(4.0)
1996 <sup>r</sup>	6,996.9	3,393.1	1,830.3	91.7	3.5	1.5	2.1	6.9
1997 <sup>r</sup>	7,267.8	3,521.0	1,934.3	101.2	3.9	3.8	5.7	10.4
1998	7,551.9	3,595.6	2,019.5	113.8	3.9	2.1	4.4	12.4

Source: Council of Economic Advisors, "Economic Indicators" (Monthly); Bureau of Census; and Aerospace Industries Association.

a Aerospace industry constant dollar sales based on AIA's aerospace composite price deflator, 1987=100. Others based on GDP deflator, 1992=100.

b Parentheses indicate negative real annual growth.

r Revised.

## GROSS DOMESTIC PRODUCT, FEDERAL BUDGET, AND DEFENSE BUDGET

Fiscal Years 1967–2000  
(Billions of Dollars)

Year	Fiscal Year GDP	Federal Budget Outlays		Defense Outlays <sup>c</sup> as percent of	
		Net Total <sup>a</sup>	National Defense <sup>b</sup>	GDP	Federal Budget
1967	\$ 811.9	\$ 157.5	\$ 71.4	8.8%	45.4%
1968	868.0	178.1	81.9	9.4	46.0
1969	948.1	183.6	82.5	8.7	44.9
1970	1,009.4	195.6	81.7	8.1	41.8
1971	1,077.4	210.2	78.9	7.3	37.5
1972	1,177.0	230.7	79.2	6.7	34.3
1973	1,306.8	245.7	76.7	5.9	31.2
1974	1,438.1	269.4	79.3	5.5	29.5
1975	1,554.5	332.3	86.5	5.6	26.0
1976	1,730.4	371.8	89.6	5.2	24.1
Tr.Qtr.	454.8	96.0	22.3	4.9	23.2
1977	1,971.4	409.2	97.2	4.9	23.8
1978	2,212.6	458.7	104.5	4.7	22.8
1979	2,495.9	504.0	116.3	4.7	23.1
1980	2,718.9	590.9	134.0	4.9	22.7
1981	3,049.1	678.2	157.5	5.2	23.2
1982	3,211.3	745.8	185.3	5.8	24.8
1983	3,421.9	808.4	209.9	6.1	26.0
1984	3,812.0	851.9	227.4	6.0	26.7
1985	4,102.1	946.4	252.7 <sup>b</sup>	6.2	26.7
1986	4,374.3	990.5	273.4	6.2	27.6
1987	4,605.1	1,004.1	282.0	6.1	28.1
1988	4,953.5	1,064.5	290.4	5.9	27.3
1989	5,351.8	1,143.7	303.6	5.7	26.5
1990	5,684.5	1,253.2	299.3	5.3	23.9
1991	5,858.8	1,324.4	273.3 <sup>c</sup>	4.7	20.6
1992	6,143.2	1,381.7	298.4 <sup>c</sup>	4.9	21.6
1993	6,475.1	1,409.4	291.1 <sup>c</sup>	4.5	20.7
1994	6,845.7	1,461.7	281.6	4.1	19.3
1995	7,197.7 <sup>r</sup>	1,515.7	272.1	3.8	17.9
1996	7,549.2 <sup>r</sup>	1,560.5	265.8 <sup>r</sup>	3.5	17.0
1997	7,996.5 <sup>r</sup>	1,601.2	270.5	3.4	16.9
1998	8,404.5	1,652.6	268.5	3.2	16.2
1999 <sup>E</sup>	8,747.9	1,727.1	276.7	3.2	16.0
2000 <sup>E</sup>	9,105.8	1,765.7	274.1	3.0	15.5

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

a "Net Total" is government-wide total less intragovernmental transactions.

b "National Defense" includes the military budget of DoD and other defense-related activities. Beginning in 1985, the Federal Budget reflects establishment of a military retirement trust fund. Data for prior years adjusted for comparable treatment of military retired pay.

c 1991–1993 reflects transfers from the Defense Cooperation Account funded by foreign government and private cash contributions reducing total U.S.-funded military outlays.

E Estimate.

r Revised.

Tr.Qtr. See Glossary.

**FEDERAL OUTLAYS**  
**DEFENSE, NASA, AND AEROSPACE PRODUCTS & SERVICES**  
 Fiscal Years 1973–2000  
 (Millions of Dollars)

Year	TOTAL National Defense	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aero- space as Percent of Total National Defense and NASA
			TOTAL	DoD <sup>a</sup>	NASA	
1973	\$ 76,681	\$ 3,315	\$11,360	\$ 8,089	\$ 3,271	14.2%
1974	79,347	3,256	11,168	7,987	3,181	13.5
1975	86,509	3,267	11,544	8,373	3,181	12.9
1976	89,619	3,669	12,364	8,816	3,548	13.3
Tr.Qtr.	22,269	951	2,855	1,959	926	12.3
1977	97,241	3,945	13,229	9,389	3,840	13.1
1978	104,495	3,983	13,926	10,067	3,859	12.8
1979	116,342	4,197	16,686	12,622	4,064	13.8
1980	133,995	4,852	20,269	15,558	4,711	14.6
1981	157,513	5,421	24,276	19,002	5,274	14.9
1982	185,309	6,035	29,501	23,575	5,926	15.4
1983	209,903	6,664	35,364	28,808	6,556	16.3
1984	227,413	7,048	39,663	32,723	6,940	16.9
1985	252,748	7,318	44,483	37,335	7,148	17.1
1986	273,375	7,404	49,773	42,558	7,215	17.7
1987	281,999	7,591	51,871	44,429	7,442	17.9
1988	290,361	9,092	48,848	39,922	8,926	16.3
1989	303,559	11,036	52,933	42,072	10,861	16.8
1990	299,331	12,429	53,194	40,992	12,202	17.1
1991 <sup>b</sup>	273,292	13,878	53,630	40,089	13,541	18.7
1992 <sup>b</sup>	298,350	13,961	50,569	37,085	13,484	16.2
1993 <sup>b</sup>	291,086	14,305	45,496	31,763	13,733	14.9
1994	281,642	13,695	41,082	27,774	13,308	13.9
1995	272,066	13,378	36,696	23,638	13,058	12.9
1996	265,753 <sup>f</sup>	13,881	32,947	20,530	12,417	11.8
1997	270,505 <sup>f</sup>	14,360	32,808	19,888	12,920	11.5
1998	268,456	14,206	33,184	20,380	12,804	11.7
1999 <sup>E</sup>	276,730	14,043	32,922	20,165	12,757	11.3
2000 <sup>E</sup>	274,069	13,357	32,503	20,314	12,189	11.3

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually); Department of Defense, "Status of Funds" (Annual Summaries); and NASA, "Pocket Statistics" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "TOTAL NASA" includes all categories of the NASA budget; NASA construction is not included. "Aerospace Products and Services." See additional explanation with following table.

a Outlays for aircraft and missile procurement. Does not include RDT&E, which DoD has not reported by product group since 1977, and which, for comparability, has been subtracted from data previously reported in this table for earlier years. Also included are revisions to missile procurement data.

b 1991–1993 reflects transfers from the Defense Cooperation Account funded by foreign government and private cash contributions reducing total U.S.-funded military outlays.

E Estimate. Latest year reflects Administration's budget proposal.

Tr.Qtr. See Glossary.

r Revised.



## FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1967–2000

(Millions of Dollars)

Year	TOTAL	Department of Defense <sup>a</sup>			NASA <sup>b</sup>
		TOTAL	Aircraft	Missiles	
1967	\$15,478	\$10,341	\$ 8,411	\$ 1,930	\$ 5,137
1968	16,279	11,681	9,462	2,219	4,598
1969	15,872	11,686	9,177	2,509	4,186
1970	14,559	10,860	7,948	2,912	3,699
1971	12,918	9,580	6,549	3,031	3,338
1972	12,309	8,936	5,927	3,009	3,373
1973	11,360	8,089	5,066	3,023	3,271
1974	11,168	7,987	5,006	2,981	3,181
1975	11,554	8,373	5,484	2,889	3,181
1976	12,364	8,816	6,520	2,296	3,548
Tr. Qtr.	2,885	1,959	1,557	402	926
1977	13,229	9,389	6,608	2,781	3,840
1978	13,926	10,067	6,971	3,096	3,859
1979	16,686	12,622	8,836	3,786	4,064
1980	20,269	15,558	11,124	4,434	4,711
1981	24,276	19,002	13,193	5,809	5,274
1982	29,501	23,575	16,793	6,782	5,926
1983	35,364	28,808	21,013	7,795	6,556
1984	39,663	32,723	23,196	9,527	6,940
1985	44,483	37,335	26,586	10,749	7,148
1986	49,773	42,558	30,828	11,730	7,215
1987	51,871	44,429	32,956	11,473 <sup>c</sup>	7,442
1988	48,848	39,922	28,246	11,676	8,926
1989	52,933	42,072	27,569	14,503	10,861
1990	53,194	40,992	26,142	14,851	12,202
1991	53,630	40,089	25,689	14,400	13,541
1992	50,569	37,085	23,581	13,504	13,484
1993	45,496	31,763	20,359	11,404	13,733
1994	41,082	27,774	18,840	8,934	13,308
1995	36,696	23,638	16,125	7,513	13,058
1996	32,947	20,530	14,331	6,199	12,417
1997	32,808	19,888	14,663	5,225	12,920
1998	33,184	20,380	15,473	4,907	12,804
1999 <sup>E</sup>	32,922	20,165	15,783	4,382	12,757
2000 <sup>E</sup>	32,503	20,314	16,158	4,156	12,189

Source: Department of Defense, "Status of Funds" (Annual Summaries); Office of Management and Budget, "The Budget of the United States Government" (Annually); and NASA, "Pocket Statistics" (Annually).

a Outlays for aircraft and missile procurement. Does not include RDT&E, which DoD has not reported by product group since 1977, and which for comparability, has been subtracted from data previously reported in this table for earlier years.

b Includes Research & Development and Research & Program Management, and effective with 1984 data, Space Flight, Control, and Data Communications; excludes Construction of Facilities.

c Beginning in 1978, DoD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement, of which missiles comprise approximately 80 percent.

E Estimate. Latest year reflects Administration's budget proposal.

Tr. Qtr. See Glossary.

**DEPARTMENT OF DEFENSE  
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE<sup>a</sup>**

Fiscal Years 1991–2000  
(Millions of Dollars)

	1991	1992	1993	1994
<b>TOTAL</b> .....	\$262,389 <sup>d</sup>	\$286,892 <sup>d</sup>	\$278,561 <sup>d</sup>	\$268,622
<b>Procurement—TOTAL</b> .....	<u>\$ 82,028</u>	<u>\$ 74,881</u>	<u>\$ 69,936</u>	<u>\$ 61,769</u>
Aircraft .....	25,689	23,581	20,359	18,840
Missiles <sup>b</sup> .....	14,400	13,504	11,404	8,934
Ships .....	11,512	11,035	10,136	9,132
Weapons <sup>b</sup> .....	3,716	3,324	3,061	1,795
Ammunition .....	2,103	1,996	1,383	997
Other <sup>c</sup> .....	24,609	21,442	23,593	22,071
<b>Military Personnel—TOTAL</b> .....	<u>83,439</u>	<u>81,171</u>	<u>75,904</u>	<u>73,137</u>
Active Forces .....	74,571	71,433	66,494	63,686
Reserve Forces .....	8,868	9,738	9,410	9,449
RDT&E .....	34,589	34,632	36,968	34,762
Operations & Maintenance .....	101,769	91,989	94,094	87,929
Military Construction .....	3,497	4,262	4,831	4,979
Family Housing .....	3,296	3,271	3,255	3,316
Other <sup>d</sup> .....	(46,229) <sup>d</sup>	(3,313) <sup>d</sup>	(6,428) <sup>d</sup>	2,729

Source: Department of Defense, "Status of Funds" (Annual Summaries) and Office of Management and Budget, "The Budget of the United States Government" (Annually).

NOTE: Data in parentheses are credit items. Detail may not add to totals because of rounding.

- a Includes all items in the DoD military budget; excludes the DoD civil budget for the Army Corps of Engineers and other non-defense related activities.
- b Beginning in 1978, DoD combined Navy Missiles Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.
- c Includes Communications and Electronics.
- d 1991–1993 reflects transfers from the Defense Cooperation Account funded by foreign government and private contributions reducing total U.S.-funded military outlays.
- e Estimate. Latest year reflects Administration's budget proposal.

**DEPARTMENT OF DEFENSE  
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE<sup>a</sup> (Continued)**

Fiscal Years 1991–2000  
(Millions of Dollars)

1995	1996	1997	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
\$259,442	\$253,187	\$258,311	\$256,122	\$263,556	\$260,834
<u>\$ 54,982</u>	<u>\$ 48,913</u>	<u>\$ 47,690</u>	<u>\$ 48,206</u>	<u>\$ 48,422</u>	<u>\$ 47,038</u>
16,125	14,331	14,663	15,473	15,783	16,158
7,513	6,199	5,225	4,907	4,382	4,156
8,780	7,346	7,085	6,784	7,293	5,963
1,783	1,788	1,918	1,824	1,727	1,705
1,339	1,232	1,615	1,761	2,012	1,804
19,441	18,017	17,184	17,457	17,225	17,252
<u>70,809</u>	<u>66,669</u>	<u>69,724</u>	<u>68,976</u>	<u>71,957</u>	<u>75,437</u>
61,606	57,843	60,371	59,793	62,177	65,483
9,203	8,826	9,353	9,183	9,780	9,954
34,594	36,494	37,015	37,420	36,758	34,523
91,078	88,759	92,461	93,473	96,839	97,575
6,823	6,683	6,187	6,044	5,287	4,708
3,571	3,828	4,003	3,871	3,894	3,700
(2,415)	1,841	1,231	(1,868)	399	(2,147)

**FEDERAL PRICE DEFLATORS FOR GDP, DEFENSE, PPI, AND CPI  
(1968–2000)**

Year	GDP		Federal Government Defense Purchases		PPI, Capital Equip- ment	CPI, (Urban) All items
	FY GDP	CY GDP	Goods & Services	Equipment Investment		
	(FY 1992 =100)	(CY 1992 =100)	(CY 1992 =100)	(CY 1992 =100)	(CY 1982 =100)	(CY 82–84 =100)
1968	27.2	27.6	22.92	45.20	37.0	34.8
1969	28.4	28.9	24.18	46.99	38.3	36.7
1970	29.9	30.5	25.94	49.24	40.1	38.8
1971	31.5	32.1	28.24	51.88	41.7	40.5
1972	33.0	33.4	31.01	51.73	42.8	41.8
1973	34.4	35.3	33.66	52.09	44.2	44.4
1974	36.9	38.5	37.24	54.20	50.5	49.3
1975	40.7	42.1	41.10	57.05	58.2	53.8
1976	43.7	44.6	43.85	58.62	62.1	56.9
1977	47.0	47.4	47.21	62.69	66.1	60.6
1978	50.3	50.9	50.82	67.99	71.3	65.2
1979	54.4	55.2	55.81	73.72	77.5	72.6
1980	59.3	60.3	62.05	78.90	85.8	82.4
1981	65.1	66.0	68.23	86.44	94.6	90.9
1982	69.7	70.2	72.96	91.69	100.0	96.5
1983	72.9	73.2	76.20	95.75	102.8	99.6
1984	75.8	75.9	81.23	99.50	105.2	103.9
1985	78.4	78.5	83.51	99.93	107.5	107.6
1986	80.6	80.6	84.49	98.53	109.7	109.6
1987	82.9	83.1	85.62	94.38	111.7	113.6
1988	85.8	86.1	87.30	93.88	114.3	118.3
1989	89.4	89.7	89.79	94.64	118.8	124.0
1990	93.2	93.6	92.92	96.81	122.9	130.7
1991	97.2	97.3	96.47	98.84	126.7	136.2
1992	100.0	100.0	100.00	100.00	129.1	140.3
1993	102.6	102.6	101.77	101.72	131.4	144.5
1994	105.1	105.1	103.63	105.23	134.1	148.2
1995	107.7 <sup>r</sup>	107.5 <sup>r</sup>	106.48	108.02	136.7	152.4
1996	109.8 <sup>r</sup>	109.5 <sup>r</sup>	109.98	108.74	138.3	156.9
1997	111.8 <sup>r</sup>	111.6 <sup>r</sup>	112.00	106.61	138.2	160.5
1998	113.2	112.7	113.27	104.34	137.6	163.0
1999 <sup>E</sup>	114.6	114.4	NA	NA	NA	166.7
2000 <sup>E</sup>	116.9	116.8	NA	NA	NA	170.6

Source: Bureau of Economic Analysis, "Current Business Statistics" (Monthly) and Price Measurement Branch; Council of Economic Advisers, "Economic Report of the President" (Annually); and Office of Management and Budget, "The Budget of the United States Government" (Annually).

<sup>E</sup> Estimate.

NA Not Available.

<sup>r</sup> Revised.

Key: PPI = Producer Price Index for Capital Equipment.

CPI = Consumer Price Index, All Items, All Urban Consumers for 1978 and subsequent years. Previous years, All Urban Wage Earners.

GDP = Gross Domestic Product.

## PRICE DEFLATORS FOR AEROSPACE INDUSTRY

Calendar Years 1972-1998

Year	Aerospace Deflators (1987 = 100)					
	Composite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764,9
1972	33.7	39.9	30.1	36.6	39.7	34.4
1973	37.7	41.2	30.9	38.1	39.4	35.6
1974	41.5	44.8	34.9	44.0	41.6	40.5
1975	46.6	48.3	42.3	51.6	45.2	49.2
1976	51.0	52.8	45.9	56.5	50.4	53.8
1977	54.6	56.2	49.1	58.7	55.6	58.2
1978	57.5	59.3	54.6	55.2	60.7	63.6
1979	63.5	65.3	60.9	58.9	69.7	70.0
1980	70.6	72.9	66.3	65.3	78.9	78.5
1981 <sup>a</sup>	79.5	80.8	77.0	74.9	87.1	89.5
1982	87.9	89.8	85.2	84.3	93.4	97.2
1983	92.2	94.4	89.5	87.9	98.6	101.5
1984	99.8	105.9	98.1	93.6	100.7	102.9
1985 <sup>a</sup>	98.7	100.7	99.2	94.4	102.4	103.2
1986	99.8	100.6	99.3	97.9	103.5	102.4
1987	100.0	100.0	100.0	100.0	100.0	100.0
1988	101.9	102.2	103.0	103.5	95.0	100.3
1989	106.1	111.0	105.8	106.8	91.4	100.6
1990	110.5	116.8	111.7	109.8	91.5	98.1
1991	114.6	121.3	117.0	113.6	94.4	94.6
1992 <sup>b</sup>	118.2	125.2	122.7	118.0	93.1	83.5
1993	121.2	129.5	124.7	120.9	94.3	84.6
1994	123.8	133.9	128.0	123.5	93.4	80.4
1995	125.7	138.3	129.9	124.4	91.8	77.3
1996	127.4	141.5	132.4	128.8	88.4	77.0
1997	130.0	143.4	133.7	131.4	90.0	79.4
1998	130.5	143.8	134.7	133.0	88.1 <sup>E</sup>	78.9 <sup>E</sup>

Source: Aerospace Industries Association, based on data from: Bureau of Labor Statistics, Producer Price Indices; Bureau of Economic Analysis, Chain-Type Price Indexes and Implicit Price Deflators; and International Trade Administration.

a The International Trade Administration has discontinued its reporting of the Aerospace Deflators with 1986. Subsequent composite deflators computed by AIA and deflators for 1985 and 1986 revised for consistency.

b The Bureau of Economic Analysis discontinued its reporting in 1995 of the National Defense Purchases Deflators (used in AIA's Composite calculations). 1992-1994 revised using 1992 fixed weights and BEA's Chain-Type Price Indexes for National Defense Investment and Consumption Expenditures.

E Estimated.

r Revised.

Key: SIC = Standard Industrial Classification, SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Propulsion; SIC 3769 = Space Equipment not elsewhere classified.

# AIRCRAFT PRODUCTION

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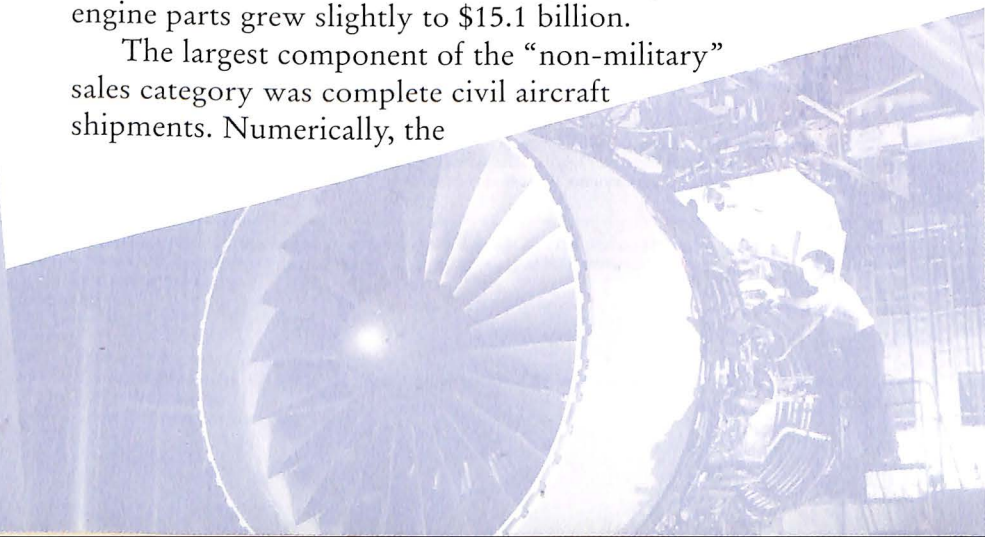
Sales of aircraft, engines, and parts grew another \$9 billion in 1998, thanks entirely to very strong growth in civil aircraft shipments. According to data supplied by the Census Bureau, aircraft sector sales totaled to \$76 billion, an increase of 13.7% over the previous year's level of \$67 billion.

The increased sales were fueled by a gain of nearly \$10 billion in non-military sales, which rose to \$52.5 billion from \$42.6 billion the previous year, a jump of 23.2%. Military sales were nearly even with the previous year, at \$23.2 billion (compared with \$23.9 billion in 1997). Overall, in inflation-adjusted constant dollars, aircraft sector sales grew for the third year in a row, after a previous 5-year decline.

Census figures also showed a decrease in new orders for aircraft, engines, and parts in 1998. Total orders came to \$64 billion, down from a revised figure of \$71 billion for the previous year. Both military and non-military orders contributed to the decline. Military orders fell from \$21.4 billion to \$17.0 billion in 1998; and non-military orders fell from \$49.7 billion to \$47.0 billion over the same period.

The backlog at year-end 1998 totaled \$143 billion, down from \$156 billion at year-end 1997. The decline in the 1998 backlog was solely driven by orders for complete aircraft and parts, which accounted for \$128 billion, or 89%, of the total. The order backlog for engines and engine parts grew slightly to \$15.1 billion.

The largest component of the "non-military" sales category was complete civil aircraft shipments. Numerically, the



industry delivered 3,135 civil aircraft, 846 more than the previous year. That total breaks down into 559 commercial transports (up 185), 363 helicopters (up 17), and 2,213 general aviation aircraft (up 644). In dollar value, 86% of the total value of shipments was in transport aircraft (\$35.5 billion out of a \$41.4 billion total). Helicopter sales came to \$252 million, up from \$231 million in 1997, and general aviation sales climbed to \$5.6 billion, up from \$4.7 billion, marking another record high year for sales in the general aviation category.

The backlog for civil transports increased again in 1998, marking the fourth year of growth. At year-end 1998, the number of planes on backlog rose to 1,786 from 1,744 at year-end 1997.

Military aircraft production for 1998 amounted to 419 units. Of that total, 269 were exported either as DoD Foreign Military Sales or by direct company-to-foreign customer sales; 150 were delivered to U.S. military agencies. The comparable figures for 1997 were 488 total, 337 exports, and 151 for the U.S. military services.

For FY 1999, the largest single military aircraft procurement was \$2.9 billion for 13 C-17 Globemaster III transports for the Air Force. Other major procurements included \$2.9 billion for 30 Navy F/A-18E/F fighters; \$769 million for two USAF F-22 Raptor fighters; \$684 million for seven Navy/Marine Corps V-22 Ospreys; \$609 million for Army AH-64 Apache helicopters; \$496 million for two USAF E-8C JSTARS surveillance aircraft; \$397 million for three Navy E-2C Hawkeye early warning and control aircraft; \$334 million for 12 Navy/Marine Corps AV-8B Harrier V/STOL fighters; \$300 million for 15 Navy T-45 Goshawk trainers; and \$272 million for 29 Army UH-60 Black Hawk helicopters. The principal procurements planned for FY 2000 were \$3.4 billion for additional Globemasters, \$2.9 billion for F/A-18E/Fs, \$1.9 billion for Air Force F-22 Raptors, \$917 million for Navy/Marine Corps V-22 Ospreys, and \$765 million for Army Apaches.



## SALES OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1984-1998

(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		Military	Non-Mil.	Military	Non-Mil.	Military	Non-Mil.
<b>CURRENT DOLLARS</b>							
1984	\$37,285	\$23,268	\$14,017	\$18,218	\$10,039	\$5,050	\$ 3,978
1985	43,940	25,758	18,182	21,642	12,607	4,116	5,575
1986	47,757	27,043	20,714	23,089	14,876	3,954	5,838
1987	49,062	27,806	21,256	22,168	14,862	5,638	6,394
1988	50,742	25,068	25,674	19,030	16,681	6,038	8,993
1989	53,825	24,287	29,538	18,256	20,140	6,031	9,398
1990	66,289	27,667	38,622	22,023	27,872	5,644	10,750
1991	68,540	25,385	43,155	19,710	33,215	5,675	9,940
1992	67,669	23,509	44,160	18,411	35,595	5,098	8,565
1993	61,086	20,099	40,987	16,118	32,780	3,981	8,207
1994	54,553	23,652	30,901	20,127	23,176	3,525	7,725
1995	55,029	22,944	32,085	19,596	22,897	3,348	9,188
1996	57,526	24,804	32,722	20,822	20,993	3,982	11,729
1997 <sup>r</sup>	66,558	23,944	42,614	21,297	33,206	2,647	9,408
1998	75,689	23,184	52,505	20,395	42,470	2,789	10,035
<b>CONSTANT DOLLARS<sup>a</sup></b>							
1984	\$37,360	\$23,315	\$14,045	\$18,255	\$10,059	\$5,060	\$ 3,986
1985	44,519	26,097	18,421	21,927	12,773	4,170	5,648
1986	47,853	27,097	20,756	23,135	14,906	3,962	5,850
1987	49,062	27,806	21,256	22,168	14,862	5,638	6,394
1988	49,796	24,601	25,195	18,675	16,370	5,925	8,825
1989	50,731	22,891	27,840	17,206	18,982	5,684	8,858
1990	59,990	25,038	34,952	19,930	25,224	5,108	9,729
1991	59,808	22,151	37,657	17,199	28,983	4,952	8,674
1992	57,250	19,889	37,360	15,576	30,114	4,313	7,246
1993	50,401	16,583	33,818	13,299	27,046	3,285	6,771
1994	44,065	19,105	24,960	16,258	18,721	2,847	6,240
1995	43,778	18,253	25,525	15,589	18,216	2,663	7,309
1996	45,154	19,469	25,684	16,344	16,478	3,126	9,206
1997 <sup>r</sup>	51,198	18,418	32,780	16,382	25,543	2,036	7,237
1998	57,999	17,766	40,234	15,628	32,544	2,137	7,690

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series IA37D (Annually).

<sup>a</sup> Based on AIA's aerospace composite price deflator, 1987=100.<sup>r</sup> Revised.

## ORDERS AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

Calendar Years 1984-1998  
(Millions of Current Dollars)

Year	GRAND TOTAL	TOTAL		Complete Aircraft & Parts		Aircraft Engines & Parts	
		Military	Non-Mil.	Military	Non-Mil.	Military	Non-Mil.
<b>NET NEW ORDERS</b>							
1984	\$ 47,102	\$29,894	\$ 17,208	\$23,312	\$ 14,064	\$6,582	\$ 3,144
1985	49,942	28,201	21,741	24,526	15,689	3,675	6,052
1986	47,957	24,124	23,833	19,852	17,592	4,272	6,241
1987	52,347	19,347	33,000	15,070	24,083	4,277	8,917
1988	82,148	24,242	57,906	17,493	41,762	6,749	16,144
1989	96,591	28,818	67,773	23,569	52,619	5,249	15,154
1990	82,386	17,735	64,651	12,766	52,371	4,969	12,280
1991	67,490	26,675	40,815	22,140	30,745	4,535	10,070
1992	49,741	19,631	30,110	16,391	20,548	3,240	9,562
1993	35,608	19,518	16,090	15,853	11,238	3,665	4,852
1994	43,518	23,352	20,166	19,806	12,854	3,546	7,312
1995	56,321	19,854	36,467	16,248	27,156	3,606	9,311
1996	70,624	25,343	45,281	21,755	33,802	3,588	11,479
1997 <sup>r</sup>	71,100	21,424	49,676	19,102	41,439	2,322	8,237
1998	63,966	17,008	46,958	14,086	36,839	2,922	10,119
<b>BACKLOG AS OF DECEMBER 31</b>							
1984	\$ 70,189	\$45,450	\$ 24,739	\$37,321	\$ 19,266	\$8,129	\$ 5,473
1985	76,191	47,893	28,298	40,205	22,348	7,688	5,950
1986	76,391	44,974	31,417	36,968	25,064	8,006	6,353
1987	80,015	36,514	43,501	29,869	34,625	6,645	8,876
1988	111,280	35,515	75,765	28,186	59,679	7,329	16,086
1989	159,150	44,026	115,124 <sup>c</sup>	36,888	95,108	7,138	20,016
1990	172,940	33,788	139,152	27,259	119,123	6,529	20,029
1991	173,676	39,149	134,527	32,795	116,139	6,354	18,388
1992	168,577	44,255	124,322	39,748	107,686	4,507	16,636
1993	142,405	46,177	96,228	41,732	82,772	4,445	13,456
1994	129,929	44,624	85,305	40,206	72,295	4,418	13,010
1995	136,871	44,642	92,229	39,673	77,802	4,969	14,427
1996	153,976	47,635	106,341	42,788	91,851	4,847	14,490
1997 <sup>r</sup>	155,546	43,615	111,931	40,562	100,022	3,053	11,909
1998	142,903	37,028	105,875	33,854	93,962	3,174	11,913

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

<sup>r</sup> Revised.

**U.S. AIRCRAFT PRODUCTION—CIVIL**  
Calendar Years 1969–1998

Year	TOTAL	Domestic Shipments			Export Shipments		
		Trans- ports	Heli- copters	General Aviation	Trans- ports	Heli- copters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64 <sup>a</sup>	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,460	176	570	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940
1983	3,356	133	187	2,172	129	216	519
1984	2,999	102	143	2,013	83	233	425
1985	2,691	126	247	1,545	152	137	484
1986	2,156	171	120	1,031	159	210	464
1987	1,800	187	116	598	170	242	487
1988	1,949	206	103	500	217	280	643
1989	2,448	138	221	225	260	294	1,310
1990	2,268	215	254	335	306	349	809
1991	2,181	204	253	487	385	318	534
1992	1,790	180	112	541	387	212	358
1993	1,630	130	83	631	278	175	333
1994	1,545	87	154	543	222	154	385
1995	1,625	119	82	714	137	210	363
1996	1,677	97	64	747	172	214	383
1997	2,289	122	87	1,160	252	259	409
1998	3,135	184	125	1,814	375	238	399

Source: Aerospace Industries Association, based on company reports; General Aviation Manufacturers Association; and Department of Commerce, International Trade Administration.

a Prior to 1976, includes the C-130 military transport.

**U.S. AIRCRAFT PRODUCTION—MILITARY**  
Calendar Years 1969–1998

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS <sup>a</sup>	Direct <sup>b</sup>
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047	625	422	194	228
1981	1,062	703	359	215	144
1982	1,159	690	469	68	401
1983	1,053	766	287	70	217
1984	936	561	375	71	304
1985	919	643	276	134	142
1986	1,107	708	399	110	289
1987	1,210	725	485	133	352
1988	1,305	687	618	138	480
1989	1,261	614	647	92	555
1990	1,053	664	387	99	290
1991	911	556	355	94	261
199	753	422	331	122	209
199	955 <sup>c</sup>	437	518	146	372 <sup>c</sup>
19	764	418	346	69	277
1 <sup>e</sup>	811 <sup>d</sup>	354	457	108	349
1	558	242	316	106	210
1997	488 <sup>f</sup>	151 <sup>f</sup>	337	181 <sup>f</sup>	156 <sup>f</sup>
1998	419	150	269	168	101

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses and Department of Commerce, International Trade Administration.

a Also includes acceptances of NATO AWACS aircraft.

b Military aircraft exported via commercial contracts, directly from manufacturers to foreign governments.

c The number of small (450 kg–2000 kg), new aircraft exported doubled in 1993 to 340 worth \$18 million.

d Includes 358 small (450 kg–2000 kg), new aircraft worth \$14.7 million.

NA Not available.

r Revised.

**CIVIL AIRCRAFT SHIPMENTS**  
Calendar Years 1984–1998

Year	TOTAL	Transport Aircraft <sup>a</sup>	Helicopters	General Aviation
<b>NUMBER OF AIRCRAFT SHIPPED</b>				
1984	2,999	185	376	2,438
1985	2,691	278	384	2,029
1986	2,155	330	330	1,495
1987	1,800	357	358	1,085
1988	1,949	423	383	1,143
1989	2,448	398	515	1,535
1990	2,268	521	603	1,144
1991	2,181	589	571	1,021
1992	1,790	567	324	899
1993	1,630	408	258	964
1994	1,545	309	308	928
1995	1,625	256	292	1,077
1996	1,677	269	278	1,130
1997	2,289	374	346	1,569
1998	3,135	559	363	2,213

**VALUE—Millions of Dollars**

1984	\$ 7,717	\$ 5,689	\$330	\$1,698
1985	10,385	8,448	506	1,431
1986	11,858	10,308	288	1,262
1987	12,148	10,507	277	1,364
1988	15,855	13,603	334	1,918
1989	17,129	15,074	251	1,804
1990	24,477	22,215	254	2,008
1991	29,035	26,856	211	1,968
1992	30,728	28,750	142	1,836
1993	26,389	24,133	113	2,144
1994	20,666	18,124 <sup>E</sup>	185	2,357
1995	18,299	15,263 <sup>E</sup>	194	2,842
1996	20,884	17,564 <sup>E</sup>	193	3,127
1997	31,834	26,929	231	4,674
1998	41,444	35,545	252	5,646

Source: Aerospace Industries Association, based on company reports and General Aviation Manufacturers' Association.

a U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

E Estimated.

CIVIL TRANSPORT AIRCRAFT BACKLOG<sup>a</sup>

As of December 31, 1994–1998

Company and Model	1994	1995	1996	1997	1998
<b>TOTAL AIRCRAFT ON ORDER</b> (Domestic and Foreign Orders)	1,126	1,291	1,617	1,744	1,786
Value (Millions of Dollars) .....	\$67,709 <sup>E</sup>	NA	NA	\$93,788	\$86,057
<b>Boeing—TOTAL</b> .....	<u>959</u>	<u>1,079</u>	<u>1,418</u>	<u>1,602</u>	<u>1,595</u>
B-737 .....	391	491	764	909	978
B-747 .....	111	121	161	159	102
B-757 .....	182	132	134	133	130
B-767 .....	128	118	86	141	134
B-777 .....	147	217	273	260	251
<b>Douglas—TOTAL</b> .....	<u>167</u>	<u>212</u>	<u>199</u>	<u>142</u>	<u>191</u>
MD-11 .....	45	21	15	14	14
MD-80/90 .....	122	141	134	78	62
MD-95 .....	—	50	50	50	115
<b>TOTAL FOREIGN ORDERS</b> .....	539	701	753	790	687
Value (Millions of Dollars) .....	\$42,962 <sup>E</sup>	NA	NA	\$51,583 <sup>E</sup>	\$38,726 <sup>E</sup>
<b>Boeing—TOTAL</b> .....	<u>415</u>	<u>570</u>	<u>637</u>	<u>709</u>	<u>625</u>
B-737 .....	132	199	234	336	344
B-747 .....	103	112	133	122	75
B-757 .....	28	21	25	38	40
B-767 .....	50	58	38	29	21
B-777 .....	102	180	207	184	145
<b>Douglas—TOTAL</b> .....	<u>124</u>	<u>131</u>	<u>116</u>	<u>81</u>	<u>62</u>
MD-11 .....	39	14	14	13	11
MD-80/90 .....	85	117	102	68	36
MD-95 .....	—	—	—	—	15

Source: Aerospace Industries Association, based on company reports.

NOTE: Boeing's unfilled orders not reported on a firm order basis.

a Unfilled firm orders excluding options for U.S.-manufactured transport aircraft over 33,000 pounds. Includes new transports contracted for lease from the manufacturer.

E Estimate.

NA Not available.

**SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT<sup>a</sup>**  
**Calendar Years 1994–1998**

<b>Company and Model</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>TOTAL</b>					
Number of Aircraft Shipped .....	309	256	269	374	559
Value (Millions of Dollars) .....	\$18,124 <sup>E</sup>	\$15,263 <sup>E</sup>	\$18,915 <sup>E</sup>	\$26,929	\$35,545
<b>Boeing—TOTAL</b> .....	<u>270</u>	<u>206</u>	<u>218</u>	<u>320</u>	<u>505</u>
B-737 .....	121	89	76	135	281
B-747 .....	40	25	26	39	53
B-757 .....	69	43	42	46	50
B-767 .....	40	36	42	41	47
B-777 .....	—	13	32	59	74
<b>Douglas—TOTAL</b> .....	<u>39</u>	<u>50</u>	<u>51</u>	<u>54</u>	<u>54</u>
MD-11 .....	17	18	15	12	12
MD-80 .....	22	18	12	16	8
MD-90 .....	—	14	24	26	34

Source: Aerospace Industries Association, based on company reports.  
a U.S.-manufactured fixed-wing aircraft over 33,000 lbs.  
E Estimated.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT<sup>a</sup>

On Order or in Production as of 1998

Number of Engines and Crew, and Model Designation <sup>b</sup>	Initial Service	Standard Mixed Class	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles) <sup>c</sup>	Engine Manufacturer <sup>d</sup> and Model
<b>FOUR ENGINES/CREW OF 2</b>						
747-400*	1989	416	399	875	7,335	GE CF6-80C2, P&W PW4000, or RR RB211-524
<b>THREE ENGINES/CREW OF 2</b>						
MD-11*	1990	285-410	292	631	7,110	GE CF6-80C2-DF1 or P&W PW4460
<b>TWO ENGINES/CREW OF 2</b>						
MD-83	1985	155	81	160	2,534	P&W JT8D-219
MD-90	1995	152	90	168	2,403	IAE V2500-D5
MD-95 (717)	1999	106	70	121	1,375	BMW-RR BR715
737-300	1984	126-149	72	139	2,255	CFMI CFM56-3C-1
737-400	1988	147-168	76	150	2,060	CFMI CFM56-3C-1
737-500	1990	110-132	70	134	2,380	CFMI CFM56-3C-1
737-600	1998	110-132	81	144	3,155	CFMI CFM56-7B
737-700	1997	126-149	84	155	3,300	CFMI CFM56-7B
737-800	1998	162-189	91	174	2,925	CFMI CFM56-7B
737-900	2001	177-189	94	174	2,725	CFMI CFM56-7B
757-200	1983	201-231	129	255	3,950	RR RB211-535 or P&W PW2000
757-300	1999	243-279	141	270	3,470	RR RB211-535 or P&W PW2000
767-200*	1982	181-285	187	395	6,650	P&W PW4000 or GE CF6-80C2
767-300*	1986	218-350	200	412	6,150	P&W PW4000, GE CF6-80C2, or RR RB211-524
767-400*	2000	245-375	227	450	5,625	P&W PW4000, GE CF6-80C2, or RR R211-524
777-200*	1995	305-440	310	545	5,150	RR Trent, GE GE90, or P&W PW4000
777-300*	1998	368-550	352	660	5,600	RR Trent, GE GE90, or P&W PW4000

Source: Aerospace Industries Association, based on company reports.

a All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

b The Boeing Company manufacturers models: 737, 747, 757, 767, &amp; 777 and its Douglas Products Division manufacturers models: MD-11, MD-80, MD-90, and MD-95 (renamed the 717).

c Full passenger load and baggage.

d P&amp;W = Pratt &amp; Whitney; GE = General Electric; RR = Rolls-Royce; CFMI = General Electric/Snecma; IAE = International Aero Engines; BMW = Bayerische Motoren Werke.

\* Wide-body aircraft.



## SPECIFICATIONS OF U.S. CIVIL HELICOPTERS

In Production as of 1998

Company	Commercial Model	Number of Places	Useful Load (Lbs.)	Range with Useful Load (N.Miles)	External Cargo Payload (Lbs.)
Enstrom Helicopter	F-28 Series	3	1,030	241	1,000
	280 Series	3	1,015	260	1,000
	480 Series	5	1,175	375	1,000
Hiller Aircraft	UH-12E3	3	1,341	232	1,000
	UH-12E3T	3	1,460	172	1,000
Kaman	K-1200	1	500	267	6,855
McDonnell Douglas Helicopter	500 Series	5	1,519	264	2,069
	520 Series	5	1,764	210	2,364
	530F	5	1,509	232	2,159
	600 Series	8	2,170	380	2,720
	900 Series	8	2,975	303	3,000
Robinson Helicopter	R22	2	531	180	—
	R44	4	980	365	—
Schweizer Aircraft	300C	3	950	201	1,050
	300CB	2	662	NA	—
	330	4	1,120	300	—
Sikorsky Aircraft	S-76C	14	4,813	439	3,300

Source: Helicopter Association International, "1999 Helicopter Annual" (Annually).

NA Not available.

**CIVIL HELICOPTER SHIPMENTS<sup>a</sup>**  
**Calendar Years 1994–1998**

Company and Model	1994	1995	1996	1997	1998
<b>CIVIL SHIPMENTS</b> .....	308	292	278	346	363
Value (Millions of Dollars) ...	\$185	\$194	\$193	\$231	\$252
<b>Brantley—TOTAL</b> .....	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>2</u>
B-2B .....	—	—	—	—	2
<b>Enstrom—TOTAL</b> .....	<u>17</u>	<u>11</u>	<u>11</u>	<u>12</u>	<u>14</u>
F-28/280 series .....	13	3	4	5	3
480 series.....	4	8	7	7	11
<b>Hiller<sup>b</sup>—TOTAL</b> .....	<u>—</u>	<u>1</u>	<u>1</u>	<u>—</u>	<u>—</u>
UH12E .....	—	1	1	—	—
<b>Kaman—TOTAL</b> .....	<u>5</u>	<u>6</u>	<u>8</u>	<u>4</u>	<u>2</u>
K-1200 .....	5	6	8	4	2
<b>McDonnell Douglas—TOTAL</b> ...	<u>36</u>	<u>34</u>	<u>29</u>	<u>27</u>	<u>37</u>
500 series.....	3	12	9	9	5
520N series .....	9	10	5	2	2
530 series.....	22	—	—	—	5
600 series.....	—	—	—	15	21
900 series.....	2	12	15	1	4
<b>Robinson—TOTAL</b> .....	<u>195</u>	<u>179</u>	<u>164</u>	<u>246</u>	<u>251</u>
R22 .....	89	83	86	132	117
R44 .....	106	96	78	114	134
<b>Schweizer—TOTAL</b> .....	<u>40</u>	<u>47</u>	<u>56</u>	<u>39</u>	<u>41</u>
300C .....	35	22	20	15	17
300CB .....	—	21	31	19	21
330 .....	5	4	5	5	3
<b>Sikorsky—TOTAL</b> .....	<u>15</u>	<u>14</u>	<u>9</u>	<u>18</u>	<u>16</u>
S-76 .....	15	14	9	18	16

Source: Aerospace Industries Association, based on company reports.

NOTE: All data exclude production by foreign licensees.

a Domestic and export helicopter shipments for non-military use. Helicopters in military configuration exported to foreign governments and purchased under commercial contract are reported elsewhere. Models which may be shipped in either a civil or a military configuration appear in both tables.

b Formerly reported as Rogerson.

**DIRECT EXPORT SHIPMENTS OF MILITARY HELICOPTERS<sup>a</sup>**  
**Calendar Years 1994–1998**

Manufacturer and Model	1994	1995	1996	1997	1998
<b>DIRECT MILITARY EXPORT SHIPMENTS</b> .....	30	21	8	25	50
Value (Millions of Dollars) .....	\$248	\$142	\$131	\$213	\$757
Boeing Vertol CH-47/414/352 .....	—	2	7	1	17
Hiller UH-12E .....	—	—	—	2	—
McDonnell Douglas AH-64 .....	—	—	—	—	1
Sikorsky S-70C .....	29	19	1	22	32
Sikorsky S-80M .....	1	—	—	—	—

Source: Aerospace Industries Association, company reports.

- a Shipments of helicopters in military configuration exported directly from U.S. manufacturers to foreign governments. Military helicopters exported via Foreign Military Sales (FMS) are reported with Dept. of Defense (DoD) aircraft acceptance data elsewhere in this chapter. Some models reported on this page may be shipped in either military or civil configuration; see Civil Helicopter Shipments table for additional data.

## GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers  
Calendar Years 1994–1998

	1994	1995	1996	1997	1998
<b>NUMBER OF AIRCRAFT SHIPPED</b>	928	1,077	1,130	1,569	2,213
Single-Engine, Piston .....	444	515	530	905	1,436
Multi-Engine, Piston .....	55	61	70	80	98
Turboprop .....	207	255	289	236	271
Turbojet .....	222	246	241	348	408
<b>VALUE OF SHIPMENTS<sup>a</sup></b> (Millions of Dollars) .....	\$2,357	\$2,842	\$3,127	\$4,674	\$5,647
Piston .....	\$ 94	\$ 123	\$ 146	\$ 214	\$ 337
Turboprop .....	595	653	734	740	778
Turbojet .....	1,681	2,066	2,247	3,720	4,532
<b>Number of Aircraft By Selected Manufacturer</b>					
American Champion .....	22	46	53	46	74
Aviat .....	47	42	56	61	85
Bellanca .....	2	1	2	2	1
Cessna .....	172	200	229	612	1,072
Classic .....	4	7	6	6	—
Commander .....	22	25	15	14	13
Fairchild .....	16	7	7	—	—
Gulfstream .....	22	26	27	51	61
Learjet .....	36	43	34	45	61
Maule .....	65	68	63	54	63
Mooney .....	71	84	73	86	93
Piper .....	132	165	183	222	295
Raytheon <sup>b</sup> .....	317	363	382	370	395

Source: General Aviation Manufacturers' Association.

a Manufacturers' net billing price.

b Formerly reported as Beech.

**MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES**

Number and Flyaway Value  
Calendar Years 1984–1998

Year	TOTAL	Bomber/ Patrol/ Command/ Control	Fighter/ Attack	Trans- port/ Tanker	Trainer	Heli- copter	Other
<b>NUMBER</b>							
1984	632	34	298	18	30	240	12
1985	777	34	409	25	—	306	3
1986	818	52	424	76	—	266	—
1987	858	74	483	36	—	265	—
1988	842	55	509	31	—	247	—
1989	706	24	408	21	—	253	—
1990	763	24	454	25	—	260	—
1991	650	17	395	23	—	215	—
1992	544	10	312	30	37	155	—
1993	583	11	293	25	56	198	—
1994	487	6	167	40	114	157	3
1995	462	4	133	32	102	176	15
1996	348	4	116	28	54	146	—
1997 <sup>r</sup>	332	4	202	19	26	81	—
1998	318	10	188	31	33	56	—
<b>FLYAWAY VALUE—Millions of Dollars</b>							
1984	\$ 9,308	\$1,270	\$5,774	\$ 627	\$ 18	\$1,597	\$22
1985	14,122	3,640	7,923	838	—	1,715	6
1986	20,903	8,177	8,004	2,665	—	2,057	—
1987	21,459	8,569	8,900	2,218	—	1,772	—
1988	16,031	2,911	8,953	2,314	—	1,853	—
1989	11,968	1,423	7,735	743	—	2,067	—
1990	13,036	1,499	8,731	605	—	2,201	—
1991	11,754	1,023	8,517	437	—	1,777	—
1992	11,482	613	7,673	1,346	267	1,583	—
1993	12,101	1,530	6,400	1,553	484	2,134	—
1994	13,000	3,861	3,661	3,298	477	1,686	17
1995	12,369	3,585	3,547	2,759	460	1,922	98
1996	11,383	3,596	3,524	2,350	337	1,576	—
1997 <sup>r</sup>	10,945	1,921	5,653	2,336	270	766	—
1998	13,760	4,826	5,064	2,927	319	626	—

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses.

NOTE: Data represent new U.S.-manufactured aircraft, excluding gliders and targets. Values include spares, spare parts, and support equipment that are procured with the aircraft. Includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales.

<sup>r</sup> Revised.



**MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE<sup>a</sup>**

Calendar Years 1997–1998  
(Costs in Millions of Dollars)

Type and Model	Number		Flyaway Cost <sup>b</sup>		Weapon System Cost <sup>c</sup>	
	1997	1998	1997	1998	1997	1998
<b>AIR FORCE—TOTAL</b> .....	39	44	\$4,280 <sup>r</sup>	\$7,387	\$5,264 <sup>r</sup>	\$9,284
<b>Bomber—TOTAL</b> .....	2	5	\$1,800 <sup>r</sup>	\$4,501	\$2,394 <sup>r</sup>	\$5,985
B-2 .....	2	5	1,800 <sup>r</sup>	4,501	2,394 <sup>r</sup>	5,985
<b>Fighter/Attack—TOTAL</b> .....	3	1	88 <sup>r</sup>	20	93 <sup>r</sup>	25
AC-130 .....	1	—	44	—	48	—
F-16 .....	2	1	44 <sup>r</sup>	20	45 <sup>r</sup>	25
<b>Transports/Tankers—TOTAL</b> .....	11	18	2,226	2,866	2,594	3,275
C-17 .....	7	10	2,102	2,434	2,470	2,843
C-32 .....	—	4	—	338	—	338
C-37 .....	—	2	—	73	—	73
C-38 .....	—	2	—	21	—	21
C-130 variants .....	4	—	124	—	124	—
<b>Trainer—TOTAL</b> .....	15	—	60	—	73	—
T-1A .....	15	—	60	—	73	—
<b>Helicopters—TOTAL</b> .....	8	—	106	—	111	—
H-60 .....	8	—	106	—	111	—

Source: Department of the Air Force.

a Air Force acceptances for own use; excludes FMS/MAP shipments.

b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, and non-recurring costs associated with the manufacture of aircraft.

c Weapon system cost includes flyaway costs, peculiar ground equipment, training equipment, and technical data.

r Revised.

**MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY<sup>a</sup>**

Calendar Years 1997–1998

Type and Model	Number <sup>c</sup>		Flyaway Cost <sup>b</sup>		Weapon System Cost <sup>c</sup>	
	1997	1998	1997	1998	1997	1998
<b>ARMY—TOTAL</b> .....	53 <sup>r</sup>	54	\$374 <sup>r</sup>	\$429	\$404 <sup>r</sup>	\$474
<b>Helicopters—TOTAL</b> .....	48 <sup>r</sup>	41	\$352 <sup>r</sup>	\$368	\$382 <sup>r</sup>	\$412
UH-60L .....	48 <sup>r</sup>	41	352 <sup>r</sup>	368	382 <sup>r</sup>	412
<b>Transports/Tankers—TOTAL</b> .....	5	13	22	61	22	61
C-23 .....	—	8	22	41	—	41
UC-35 .....	5	5	—	21	22	21

Source: Department of the Army.

a Army acceptances for own use; excludes FMS/MAP shipments.

b Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.

c Weapon System Cost includes flyaway cost, initial spares, ground equipment, training equipment and other support items.

r Revised.

**MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY<sup>a</sup>**

Calendar Years 1997–1998  
(Costs in Millions of Dollars)

Type and Model	Number		Flyaway Cost <sup>b</sup>		Weapon System Cost <sup>c</sup>	
	1997	1998	1997	1998	1997	1998
<b>NAVY—TOTAL</b> .....	59 <sup>r</sup>	72	\$1,624 <sup>r</sup>	\$1,511	\$1,894 <sup>r</sup>	\$1,820
<b>Patrol—TOTAL</b> .....	<u>2</u>	<u>3</u>	<u>\$ 121<sup>r</sup></u>	<u>\$ 191</u>	<u>\$ 160<sup>r</sup></u>	<u>\$ 212</u>
E-2 .....	2	3	121 <sup>r</sup>	191	160 <sup>r</sup>	212
<b>Fighter/Attack—TOTAL</b> .....	<u>31</u>	<u>25</u>	<u>1,115</u>	<u>843</u>	<u>1,271</u>	<u>969</u>
F/A-18 .....	27	15	1,011	603	1,140	653
AV-8B .....	4	10	104	239	131	315
<b>Trainers—TOTAL</b> .....	<u>11<sup>r</sup></u>	<u>33</u>	<u>210<sup>r</sup></u>	<u>319</u>	<u>247<sup>r</sup></u>	<u>456</u>
T-39 .....	— <sup>r</sup>	17	— <sup>r</sup>	27	— <sup>r</sup>	43
T-45A .....	11	16	210	292	247 <sup>r</sup>	413
<b>Helicopters—TOTAL</b> .....	<u>15<sup>r</sup></u>	<u>11</u>	<u>178<sup>r</sup></u>	<u>159</u>	<u>216<sup>r</sup></u>	<u>184</u>
AH-1W .....	11	8	106	75	127	92
CH-53 .....	4 <sup>r</sup>	3	72 <sup>r</sup>	84	90 <sup>r</sup>	92

Source: Department of the Navy.

a Navy acceptances for own use; excludes FMS shipments.

b Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment, non-recurring costs, and ancillary equipment.

c Weapons System Cost (Investment Cost) includes flyaway cost, initial spares, ground equipment, training equipment, and other support items.

r Revised.

**MILITARY AIRCRAFT ACCEPTANCES  
FOR REIMBURSABLE PROGRAMS<sup>a</sup>**

Calendar Years 1997-1998  
(Millions of Dollars)

Accepting Agency, Type, and Model	Number of Aircraft Accepted		Flyaway Cost <sup>b</sup>	
	1997	1998	1997	1998
<b>TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS ...</b>	181 <sup>r</sup>	168	\$4,668 <sup>r</sup>	\$4,433
<b>AIR FORCE—TOTAL</b> .....	123 <sup>r</sup>	149	\$3,024 <sup>r</sup>	\$3,743
<b>Fighter/Attack<sup>1</sup>—TOTAL</b> .....	<u>120<sup>r</sup></u>	<u>149</u>	<u>2,936<sup>r</sup></u>	<u>3,743</u>
F-15 .....	16	41	912	1,743
F-16 .....	104 <sup>r</sup>	108	2,024 <sup>r</sup>	2,000
<b>Transports/Tankers</b> .....	<u>3</u>	<u>—</u>	<u>88</u>	<u>—</u>
C-130 .....	3	—	88	—
<b>NAVY—TOTAL</b> .....	56	15	\$1,609	\$ 590
<b>Patrol—TOTAL</b> .....	<u>—</u>	<u>2</u>	<u>—</u>	<u>132</u>
E-2C .....	—	2	—	132
<b>Fighter/Attack—TOTAL</b> .....	<u>48</u>	<u>13</u>	<u>1,513</u>	<u>458</u>
AV-8B .....	9	—	234	—
F/A-18 .....	39	13	1,279	458 <sup>E</sup>
<b>Helicopters—TOTAL</b> .....	<u>8</u>	<u>—</u>	<u>96</u>	<u>—</u>
AH-1 .....	8	—	96	—
<b>ARMY—TOTAL</b> .....	2	4	\$ 35	\$ 100
<b>Helicopters—TOTAL</b> .....	<u>2</u>	<u>4</u>	<u>35</u>	<u>100</u>
AH-64 .....	2	4	35	100 <sup>E</sup>

Source: Aerospace Industries Association, based on USAF, USN, and USA survey responses.

a Foreign government aircraft purchases through the Department of Defense Foreign Military Sales program.

b Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment, and non-recurring costs associated with the manufacture of the aircraft.

E Estimate.

r Revised.

## MILITARY AIRCRAFT PROGRAM PROCUREMENT

Fiscal Years 1998, 1999, and 2000  
(Millions of Dollars<sup>a</sup>)

Agency and Model	1998		1999 <sup>E</sup>		2000 <sup>E</sup>	
	No.	Cost	No.	Cost	No.	Cost
<b>AIR FORCE</b>						
B-1B .....	—	\$ 10.7	—	\$ —	—	\$ —
B-2 Spirit .....	—	175.7	—	238.6	—	106.9
C-17 Globemaster III .....	9	2,130.9	13	2,891.0	15	3,385.0
C-130J Hercules .....	4	251.6	3	221.4	—	30.6
Civil Air Patrol Aircraft .....	27	2.9	27	3.0	27	2.5
E-8C JSTARS .....	1	320.6	2	495.5	1	280.3
EC-130J .....	1	48.4	1	84.8	—	—
F-15E Eagle .....	5	214.0	—	—	—	—
F-16 Falcon .....	3	115.8	1	67.0	10	282.6
F-22 Raptor .....	—	73.3	2	769.1	6	1,852.1
JPATS <sup>b</sup> .....	22	73.3	22	105.9	29	133.0
Unmanned Aerial Vehicles ...	20	135.8	15	114.2	3	38.0
VCX .....	3	186.5	6	320.6	—	—
WC-130J .....	2	123.8	1	75.2	—	—
<b>ARMY</b>						
AH-64 Apache .....	—	\$ 497.5	—	\$ 608.9	—	\$ 765.2
C-XX .....	5	22.0	5	26.9	—	—
TIARA .....	—	51.8	—	15.0	—	—
UH-60 Black Hawk .....	28	280.3	29	271.6	8	102.8
<b>NAVY</b>						
AV-8B Harrier .....	12	\$ 299.2	12	\$ 333.8	12	\$ 291.3
C-40A .....	—	—	—	—	1	49.0
CH-60S .....	1	29.7	5	137.2	13	282.3
E-2C Hawkeye .....	4	311.5	3	397.3	3	383.0
EA-6B Prowler .....	—	112.5	—	95.2	—	160.7
F/A-18C/D .....	8	272.5	—	—	—	—
F/A-18E/F Hornet .....	20	2,106.4	30	2,870.6	36	2,854.2
KC-130J .....	2	117.1	2	112.1	—	12.3
SH-60R .....	—	—	—	—	7	216.7
T-45 Goshawk .....	15	282.6	15	300.2	15	335.0
V-22 Osprey <sup>b</sup> .....	7	676.6	7	683.9	10	916.9

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually) and "Procurement Programs (P-1)" (Annually).

NOTE: See Research and Development Chapter for aircraft program RDT&E authorization data.

a Total Obligational Authority for procurement, excluding initial spares.

b Air Force and Navy funding.

E Estimate. Latest year reflects Administration's budget proposal.

**ACTIVE U.S. MILITARY AIRCRAFT<sup>a</sup>**  
**Fiscal Years 1980–1998**

Year	Total <sup>a</sup>	Fixed-Wing Aircraft				Helicopters
		Total	Jet	Turboprop	Piston	
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982	21,728	12,063	9,647	1,900	516	9,665
1983	18,652	11,603	9,495	1,745	363	7,049
1984	18,833	11,661	9,551	1,777	333	7,172
1985	19,333	11,929	9,640	1,881	408	7,404
1986	20,157	11,919	9,730	1,803	386	8,238
1987	20,514	12,054	9,819	1,865	370	8,460
1988	21,010	12,481	9,954	2,222	305	8,529
1989	19,223	11,893	9,501	2,131	261	7,330
1990	20,017	12,817	10,360	2,199	258	7,200
1991	19,966	12,587	10,221	2,119	247	7,379
1992	19,210	11,936	9,672	2,035	229	7,274
1993	17,231	9,681	7,651	1,852	178	7,550
1994 <sup>E</sup>	17,018	9,803	7,786	1,835	182	7,215
1995 <sup>E</sup>	16,207	9,277	7,294	1,754	229	6,930
1996 <sup>b</sup>	20,554	10,154	7,798	2,199	157	10,400
1997	20,245	9,677	7,364	2,151	162	10,568
1998	15,585	9,187 <sup>c</sup>	7,082	1,951	120	6,398

Source: Aerospace Industries Association.

- a Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard Aircraft.
- b Prior years data provided by Office of the Secretary of Defense and limited to aircraft in the continental United States.
- E Estimate.
- c Includes 34 gliders.



**DEPARTMENT OF DEFENSE  
OUTLAYS FOR AIRCRAFT PROCUREMENT**

By Agency  
Fiscal Years 1965–2000  
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1965	\$ 5,200	\$ 3,115	\$ 1,739	\$ 346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr.Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	787
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983	21,013	11,799	7,490	1,724
1984	23,196	12,992	8,040	2,165
1985	26,586	15,619	8,263	2,705
1986	30,828	18,919	8,922	2,987
1987	32,956	20,036	9,614	3,306
1988	28,246	15,961	9,407	2,878
1989	27,569	14,662	10,073	2,834
1990	26,142	14,303	9,031	2,808
1991	25,689	13,794	9,055	2,840
1992	23,581	13,154	7,907	2,520
1993	20,359	11,438	7,246	1,675
1994	18,840	10,303	6,826	1,711
1995	16,125	8,891	5,685	1,549
1996	14,331	7,862	5,034	1,435
1997	14,663	7,799	5,322	1,542
1998	15,473	8,236	5,845	1,392
1999 <sup>E</sup>	15,783	7,670	6,600	1,513
2000 <sup>E</sup>	16,158	7,670	7,127	1,361

Source: Office of Management and Budget, "Budget of the United States Government" (Annually).

NOTE: Detail may not add to totals because of rounding.

<sup>E</sup> Estimate. Latest year reflects Administration's budget proposal.

Tr.Qtr. See Glossary.

**SPECIFICATIONS OF U.S. MILITARY AIRCRAFT**  
**On Order or in Production as of 1998**

Primary Mission, DoD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
<b>ATTACK</b>							
AV-8B Harrier II	Boeing/BAe	USMC	1	14	1xRR F402	Mach 1.0	V/STOL
<b>BOMBERS</b>							
B-2 Spirit	NGC	USAF	2	154	4xGE F118	6,000+ n.m.	Radar eluding strategic bomber
<b>FIGHTERS</b>							
F-15E Eagle	Boeing	USAF	2	37	2xP&W F100	Mach 2.5 class	Dual role fighter/long range interdiction
F-16A/B Fighting Falcon	LM	USAF	1-2	17	1xP&W F100	Mach 2+ class	Multitrole fighter; fully fly-by-wire; missiles, guns.
F-16C/D Fighting Falcon	LM	USAF	1-2	19	1xP&W F100/1xGE F110	Mach 2+ class	Provisions for AMRAAM, LANTIRN, Harpoon, HARM
F/A-1B/C/D Hornet	Boeing/NGC	USN/USMC	1-2	23	2xGE F404	Mach 1.8 class	Multi-mission strike fighter
F/A-18E/F Hornet	Boeing/NGC	USN/USMC	1-2	31	2xGE F414	Mach 1.8 class	Multi-mission strike fighter
F-22A Raptor	LM/Boeing	USAF	1	NA	2xPW F119	Mach 2+ class	Air superiority with near-precision ground attack
<b>COMMAND/CONTROL AND PATROL</b>							
E-2C Hawkeye	NGC	USN	5	40	2xAll T56	6+ hr. mission duration	AEW command & control; active & passive detection
E-8C Joint STARS	NGC	USAF/Army	21+	171	4xP&W JT3D	11-20+ hr. loiter	Ground surveillance/battle mgmt
E-12 P/Q	Raytheon	Army	2	9	2xP&W PT6A	4 hr. loiter	Electronic intercept
<b>CARGO-TRANSPORT</b>							
C-12R	Raytheon	Army	2	8	2xP&W PT6A	268 mph; 788 n.m.	Utility/transport
C-17A Globemaster III	Boeing	USAF	3	277	4xP&W F117	Mach 0.77; 2,400 n.m.	102 troops or 170,000 lbs.
C-20F/G/H	Gulfstream	All	2	42-43	2xRR Tay	Mach 0.80; 4,200 n.m.	Versions of Gulfstream IV
C-32A	Boeing	USAF	16	132	2xP&W 2040	Mach 0.80; 4,150 n.m.	Executive personnel transport
C-37A	Gulfstream	USAF/Army	2	48	2xBR 710	Mach 0.80; 6,500 n.m.	Version of Gulfstream V
C-40A	Boeing	USN	3-7	92	2xCFM 56-7	Mach 0.79; 3,000 n.m.	Navy Unique Fleet Essential Aircraft
C/HC-130H Hercules	LM	USAF/USN	4	82/77	4xAll T56	320 mph; 3,280 mi.	64-92 troops or 39-41,000 lbs.
C-130J	LM	USAF	3	97	4xAll AE2100	396 mph; 3,260 mi.	42,000 lbs.
KC-130T	LM	USN	5-7	80	4xAll T56	9,900 gals.	Tanker
MC-130H Combat Talon II	LM	USAF	6	90	4xAll T56	340 mph; 3,250 mi.	Support requirements of SOF
V-22 Osprey	Bell/Boeing	USMC/USAF	2	33	2xAll AE1107C	Max 316 mph; 2,100 n.m.	With internal fuel tanks, engines tilt for VTOL
<b>TRAINING</b>							
T-1A Jayhawk	Raytheon	USAF	2	10	2xP&W JT-15D	Max 538 mph	Tanker/transport trainer
T-6A Texan II	Raytheon	USN/USAF	2	5	1xP&W PT6A	Max 368 mph	Primary trainer
T-45C Goshawk	Boeing/BAe	USN	2	9	1xRR F405	Mach 1.04 at 25,000 ft.	Next generation trainer
TH-67 Creek	Bell	Army	1	2	1xAll 250	Max 135 mph; 405 mi.	Rotary wing trainer
<b>HELICOPTERS</b>							
AH-1W Super Cobra	Bell	USMC	2	10	2xGE T700	Max 218 mph; 395 mi.	Marinized attack helicopter
AH-64D Apache	Boeing	Army	2	11	2xGE T700	Max 197 mph; 445 mi.	Attack helicopter
CH-47SD	Boeing	Army	3	25	2xAll T55	Max 178 mph; 750 mi.	Heavy-lift helicopter
UH-53E	Sikorsky	USN	3-8	33-36	3xGE T64	Max 196 mph; 710 mi.	55 passengers, aux. tanks/ minesweeping
CH-60	Sikorsky	USN	4	11	2xGE T700	Max 184 mph; 373 mi.	Vertical replenishment
HH-60H Seahawk	Sikorsky	USN	4-12	14	2xGE T700	Max 184 mph; 500 mi.	Combat search and rescue, SOF
MH-60G Pave Hawk	Sikorsky	USAF/Army	3	12	2xGE T700	Max 184 mph; 1,380 mi.	11 troops; combat; search; rescue
OH-58D Kiowa Warrior	Bell	Army	2	3	1xAll 250	Max 140 mph; 220 mi.	Armed attack/reconnaissance
RAH-66 Comanche	Boeing/Sikorsky	Army	2	9	2xLHTEC T800	Max 201 mph; 1,450 mi.	Armed recon/light attack
SH-2G Super Sea-Sprite	Kaman	USN	3-4	9	2xGE T700	Max 159 mph; 500 mi.	Multi-mission helicopter
UH-60L Black Hawk	Sikorsky	Army/USAF	3	11	2xGE T700	Max 184 mph; 373 mi.	UTTAS

Source: Aerospace Industries Association, based on company reports.

KEY: All = Rolls-Royce Allison; BAe = British Aerospace; BR = BMW-Rolls Royce; GE = General Electric; LHTEC = Light Helicopter Turbine Engine Co.; LM = Lockheed Martin; NGC = Northrop Grumman; P&W = Pratt & Whitney; RR = Rolls Royce.

NA Not available.

# MISSILE PROGRAMS

Sales of missile systems and parts remained steady in 1998 at \$4.0 billion, according to Bureau of the Census figures. Orders recovered somewhat in 1998 after experiencing the downside of 1996's order spike. Net new orders for missile systems and parts rose 11% from \$4.2 billion to \$4.7 billion in 1998. Consequently, the backlog of unfilled orders rose \$0.4 billion to end 1998 at \$6.3 billion.

DoD outlays for missile procurement declined for the eighth straight year in FY 1998. DoD expenditures fell 6% to \$4.9 billion with the Air Force accounting for \$2.5 billion, Navy \$1.4 billion, and Army \$964 million. According to OMB, missile procurement will continue to drop—down to \$4.4 billion in FY 1999, then to \$4.2 billion in FY 2000.

According to the DoD's "Program Acquisition Costs by Weapon System" report, missile programs in production in 1998/99 and slated for continued funding in FY 2000 include:

**Air Force:** Joint Direct Attack Munition (JDAM), a USAF/USN program, \$161.2 million; Advanced Medium Range Air-to-Air Missile (AMRAAM), another USAF/USN program, \$143.6 million; Sensor Fuzed Weapon (SFW), \$61.3 million; and Wind Corrected Munitions Dispenser (WCMD), \$48.9 million.

**Navy:** Trident II, \$488.9 million; Joint Standoff Weapon (JSOW), a USN/USAF program, \$234.9 million; Standard air defense missile, \$198.9 million; Rolling Airframe Missile (RAM), \$45.4 million; and Standoff Land Attack Missile-Extended Range (SLAM-ER), \$38.1 million.

**Army:** Javelin advanced antitank weapon, a Army/USMC program, \$497.9 million; Hellfire helicopter-launched antiarmor missile, \$294.3 million;

Army Tactical Missile System (ATACMS), \$172.4 million; Brilliant Antiarmor Submunition (BAT), \$149.3 million; the Sense and Destroy Armor System (SADARM), \$54.5 million; and Avenger mobile anti-aircraft weapon system, \$33.8 million.

**BMDO:** Patriot, a BMDO/Army program, \$300.9 million; and Navy Area Theater, a BMDO/USN program, \$55.0 million.

Ballistic Missile Defense continued to be the single greatest recipient of DoD missile RDT&E funding. According to the DoD's "Program Acquisition Costs by Weapon System" report, RDT&E funding for Ballistic Missile Defense totaled \$3.3 billion in FY 1998 and is estimated to dip to \$3.1 billion in FY 1999, then projected to rise back to \$3.3 billion in FY 2000. The next largest missile research programs in FY 2000 will be the Joint Air-to-Surface Standoff Missile (JASSM) led by the Air Force, at \$168.4 million; Navy's Tomahawk, at \$147.2 million; and Army's BAT at \$100.5 million.

## MISSILE PROGRAM PROCUREMENT

Fiscal Years 1998, 1999, and 2000

(Millions of Dollars<sup>a</sup>)

Agency and Model	1998		1999 <sup>E</sup>		2000 <sup>E</sup>	
	No.	Cost	No.	Cost	No.	Cost
<b>AIR FORCE</b>						
AGM-130 .....	30	\$ 24.3	—	\$ 0.3	—	\$ 0.2
AMRAAM <sup>b</sup> .....	293	156.0	280	143.3	310	143.6
HAVE NAP .....	15	24.2	—	—	—	—
JDAM <sup>b</sup> .....	2,202	64.3	2,527	83.8	6,195	161.2
SFW .....	550	148.6	397	125.1	203	61.3
WCMD .....	280	11.8	676	13.8	2,922	48.9
<b>NAVY</b>						
AIM-9X <sup>b</sup> .....	—	\$ 0.3	—	\$ —	155	\$ 60.5
ESSM .....	—	10.3	—	12.9	—	11.7
JSOw <sup>b</sup> .....	180	82.6	414	169.0	808	234.9
RAM .....	100	41.0	100	44.6	90	45.4
SLAM-ER .....	—	—	54	39.3	56	38.1
Standard .....	114	176.0	120	214.2	91	198.9
Tomahawk .....	—	26.3	—	33.0	148	50.9
Trident II .....	5	266.6	5	312.4	12	488.9
<b>ARMY</b>						
ATACMS .....	109	\$ 89.8	126	\$136.7	171	\$172.4
Avenger .....	—	—	20	34.9	20	33.8
BAT .....	—	—	420	100.1	846	149.3
Hellfire.....	1,100	231.2	2,000	345.1	2,200	294.3
Javelin <sup>c</sup> .....	1,274	196.2	4,057	420.9	3,636	497.9
MLRS .....	624	19.2	—	—	—	3.3
SADARM.....	300	65.3	100	31.5	227	54.5
<b>BMDO</b>						
Patriot <sup>d</sup> .....	—	\$316.8	—	\$245.5	—	\$300.9
TMD BMC3 .....	—	14.2	—	22.8	—	—
Navy Area Theater <sup>f</sup> ...	—	14.9	21	43.2	—	55.0

Source: Department of Defense, "Program Acquisition Costs by Weapon System" (Annually).

NOTE: See Research and Development Chapter for missile program RDT&E authorization data.

a Total Obligational Authority excluding initial spares and RDT&E.

b Navy and Air Force funding.

c Army and Marine Corps funding.

d Army and BMDO funding.

e Estimate. Latest year reflects Administration's budget proposal.

f Navy and BMDO funding.

NA Not available.

**DEPARTMENT OF DEFENSE  
OUTLAYS FOR MISSILE PROCUREMENT**

By Agency  
Fiscal Years 1965–2000  
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT	Air Force	Navy	Army
1965	\$ 2,096	\$1,320	\$ 522	\$ 254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr.Qtr.	402	347	148	(93)
1977	2,781	1,501	905	374
1978	3,096 <sup>a</sup>	1,376	1,302 <sup>a</sup>	418
1979	3,786	1,537	1,702	547
1980	4,434	1,810	1,973	651
1981	5,809	2,366	2,297	1,146
1982	6,782	3,069	2,444	1,269
1983	7,795	3,383	2,812	1,600
1984	9,527	4,640	2,809	2,079
1985	10,749	5,409	2,941	2,399
1986	11,731	6,473	2,780	2,478
1987	11,473	6,002	3,157	2,314
1988	11,676	6,046	3,392	2,239
1989	14,503	7,349	4,445	2,709
1990	14,851	7,951	4,446	2,453
1991	14,400	6,906	4,954	2,540
1992	13,504	6,409	4,694	2,401
1993	11,404	5,424	3,794	2,187
1994	8,934	4,312	3,238	1,384
1995	7,513	3,845	2,694	974
1996	6,199	3,235	2,045	919
1997	5,225	2,743	1,546	936
1998	4,907	2,543	1,400	964
1999 <sup>E</sup>	4,382	2,386	1,080	916
2000 <sup>E</sup>	4,156	2,213	949	994

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Beginning 1978, DoD combined Navy Missile Procurement with torpedoes and other related products into Navy Weapons Procurement. Missiles comprise approximately 80 percent of the value of this category.

E Estimate. Latest year reflects Administration's budget proposal.

Tr.Qtr. See Glossary.

## MAJOR MISSILE PROGRAMS RESEARCH, DEVELOPMENT, PRODUCTION

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
<b>AIR-TO-AIR</b>					
AMRAAM-120B/C	USAF/USN	P	Raytheon	Alliant/ARC/ Aerojet	Raytheon/GEC/ Litton
Sidewinder-9M	USN/USAF	P	NASC	ARC	Raytheon
Sidewinder-9X	USN/USAF	D	Raytheon	Alliant	Raytheon/GEC
<b>AIR-TO-SURFACE</b>					
AGM-130A/B	USAF	P	Boeing	Alliant	Boeing/Hi
AGM-142	USAF	P	LM/Rafael	Rafael	Litton/GEC
AGM-86B/C	USAF	P	Boeing	WI	Litton/Boeing/ Interstate
GATS/GAM	USAF	P	NGC	—	Honeywell
GBU-15	USAF	P	Boeing	—	Boeing
HARM-88A/B	USN/USAF	P	Raytheon	TKC	Raytheon
*Harpoon-84A/C/D	USN	P	Boeing	TCM/TKC	Ray/Kearfott/ IBM/LSI
*Harpoon-84E	USN	P	Boeing	TCM/TKC	Hi
JASSM	USN/USAF	D	LM	TCM	Hi/Litton
JDAM	USAF/USN	D	Boeing	—	Hi/Boeing
JSOW-154	USN/USAF	D	Raytheon	—	Kearfott
Maverick-65D/G/H/K	USAF	P	Raytheon	Alliant	Raytheon
Maverick-65F	USN	P	Raytheon	Alliant	Raytheon
Maverick-65J	USN/USMC	D	Raytheon	Alliant	Raytheon
Paveway	USN/USAF	P	Raytheon	—	Raytheon/GEC
SLAM-84E	USN	P	Boeing	TCM	Boeing/Ray/Hi
WCMD	USAF	D	LM	—	LM/Hi

\* Also Surface-to-Surface

(Continued on next page)

**MAJOR MISSILE PROGRAMS (Continued)**

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
<b>ANTI-SUBMARINE</b>					
VLA-44A	USN	P	LM	TKC	LM
<b>SURFACE-TO-AIR</b>					
Hawk-23B	Army	P	Raytheon	Aerojet/ARC	Raytheon
MEADS	Army	D	LM	—	LM
NMD	Army	R,D	Boeing	Alliant/UTC	Boeing
Patriot-104	Army	P	Raytheon	ARC	Raytheon
PAC-3	Army	D	LM	ARC	LM/HI/ Boeing
RAM-116A	USN	P	Raytheon	Alliant/ARC	Raytheon
RAM-116B	USN	D	Raytheon	ARC/Alliant	Raytheon
Sea Sparrow-7M	USN	P	Raytheon	Alliant	Raytheon
Sea Sparrow-Evolved	USN	D	Raytheon	Alliant/Raufoss	Raytheon/HI
SLID	Army	D	Boeing	ARC	Boeing
Standard 2 MR	USN	P	Raytheon	ARC	HI/Raytheon
Standard 2 ER	USN	P	Raytheon	ARC	HI/Raytheon
Standard 2-IV	USN	P	Raytheon	ARC/UTC	HI/Raytheon
Standard 2-IVA	USN	D	Raytheon	ARC/UTC	HI/Raytheon
Stinger-92D/E	All	P	Raytheon	ARC	Raytheon
THAAD	Army	D	LM	UTC/Boeing	—

(Continued on next page)



## MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
<b>SURFACE-TO-SURFACE</b>					
*Harpoon-84A/C/D	USN	P	Boeing	TCM/TKC	Ray/IBM/LSI/ NGC/Kearfott
*Harpoon-84E	USN	P	Boeing	TCM/TKC	HI
Tomahawk (SLCM)	USN	P	Raytheon	WI/UTC/ARC	Ray/Litton
Tomahawk-Tactical	USN	D	Raytheon	TCM/ARC	Ray/Hi
Trident 2 (D-5)	USN	P	LM	Alliant/TKC/ ARC	LM/Draper/ Ray/Boeing/ Kearfott
<b>BATTLEFIELD SUPPORT AND ANTIARMOR</b>					
ATACMS	Army	P	LM	ARC	Honeywell
Dragon-47	Army	P	Boeing	Boeing/Alliant	Boeing
GLMRS	Army	D	LM	ARC	Litton/Hi
HELLFIRE-114A/C/F	Army/USMC	P	Boeing/LM	Alliant	LM/Boeing
HELLFIRE II-114K	Army/USMC	P	LM/Boeing	Alliant	LM/Boeing
Longbow HELLFIRE 114L	Army/USMC	P	LM/NGC	Alliant	LM/NGC/GEC
LOSAT	Army	D	LM	Alliant/ARC	Ray/Hi
Javelin	Army/USMC	P	Ray/LM	ARC	LM/Ray/GEC
MLRS-26,-270	Army	P	LM	ARC	—
MPIM/SRAW	Army	D	LM	Alliant	LM
Predator	USMC	D	LM	Alliant	LM
SMAW	USMC	P	Boeing	Boeing	—
TOW2A-71E	Army	P	Raytheon	Alliant	Raytheon
TOW2B-71F	Army	P	Raytheon	Alliant	Raytheon

Source: Aerospace Industries Association, based on company reports.

Status: R-Research; D-Development; P-Production.

\* Also Air-to-Surface

Abb: ARC	— Atlantic Research	LM	— Lockheed Martin	TCM	— Teledyne Continental Motors
GEC	— General Electric Co PLC	NASC	— Naval Air Systems Command	TKC	— Thiokol Propulsion
HI	— Honeywell	NGC	— Northrop Grumman	UTC	— United Technologies
LSI	— Lear Siegler	Ray	— Raytheon	WI	— Williams International

**ORDERS, SALES, AND BACKLOG  
MISSILE SYSTEMS AND PARTS<sup>a</sup>**

Calendar Years 1984–1998  
(Millions of Dollars)

Year	SALES—Current Dollars	SALES—Constant Dollars <sup>b</sup>
1984	\$ 6,094	\$ 6,106
1985	7,975	8,080
1986	8,236	8,253
1987	9,671	9,671
1988	9,485	9,308
1989	9,283	8,749
1990	9,102	8,237
1991	8,989	7,844
1992	9,032	7,641
1993	7,713	6,364
1994	5,294	4,276
1995	4,688	3,730
1996	4,792	3,761
1997 <sup>r</sup>	4,024	3,095
1998	4,043	3,098

Year	NET NEW ORDERS	BACKLOG AS OF DECEMBER 31
1984	\$ 7,731	\$10,043
1985	8,122	10,190
1986	11,023	12,754
1987	11,482	14,302
1988	9,437	14,255
1989	8,998	14,005
1990	7,917	12,956
1991	8,072	12,571
1992	9,234	11,814
1993	4,775	9,305
1994	2,785	5,823
1995	3,164	4,833
1996	8,672	6,563
1997 <sup>r</sup>	4,239	5,828
1998	4,724	6,259

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

a Excludes engines and propulsion units where separable.

b Based on AIA's aerospace composite price deflator, 1987=100.

r Revised.

**BALLISTIC MISSILE DEFENSE ORGANIZATION  
FUNDING BY PROJECT NUMBER**

Fiscal Years 1996–2000  
(Millions of Dollars)

Project Number and Title	1996	1997	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
1151 Sensors .....	\$192	\$ —	\$ —	\$ —	\$ —
1155 Discrimination.....	58	68	83	18	25
1161 Advanced Sensor Technology .....	19	35	29	13	—
1170 TMD Risk Reduction .....	42	23	31	15	17
1184 Engineering Analysis .....	—	—	—	14	6
1262 Mead Concepts .....	20	59	50	10	49
1264 Atmospheric Interceptor.....	—	—	32	—	—
1266 Navy Theater Wide Defense.....	200	304	438	364	330
1267 Ground-Based Interceptor .....	287	—	—	—	—
1270 Advanced Interceptors .....	36	70	43	—	—
1281 Atmospheric Interceptor Technology ...	—	—	—	43	19
1282 Exoatmospheric Interceptor Technology	—	—	—	32	19
1294 BPI/TMD Concept Development .....	6	24	14	6	—
1360 Directed Energy Programs .....	76	94	118	125	75
1460 BM/C3 Technologies .....	81	—	—	—	—
1461 BMC4I .....	—	—	—	15	5
1651 Innovative Science & Technology .....	47	59	57	23	8
1660 Statutory & Mandated Programs .....	53	68	61	66	60
2160 TMD Existing System Modifications.....	20	16	10	2	—
2257 PATRIOT .....	662	602	559	566	330
2259 ACES/ADP .....	59	42	95	46	37
2260 THAAD.....	520	616	387	434	612
2263 Navy Area TBMD .....	298	309	307	286	323

(Continued on next page)

**BALLISTIC MISSILE DEFENSE ORGANIZATION  
FUNDING BY PROJECT NUMBER (Continued)**

Fiscal Years 1996–2000  
(Millions of Dollars)

Project Number and Title	1996	1997	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
2358 HAWK System BM/C3 .....	\$ 37	\$ 15	\$ —	\$ —	\$ —
2401 NMD Integration.....	—	24	200	1,109	489
2402 Sensor Technology .....	—	54	18	2	10
2403 Ground-Based Interceptor .....	—	272	267	147	97
2404 BM/C3 Ground-Based Radar.....	—	51	61	18	17
2405 Ground-Based Radar .....	—	66	58	33	19
2406 UEWR .....	—	12	10	5	3
2407 Systems Engineering .....	—	47	26	27	29
2408 Deployment Planning.....	—	12	15	36	7
2409 Program Support .....	—	28	54	51	44
2410 Test & Evaluation .....	—	103	130	83	94
3152 NMD System Engineering .....	55	—	—	—	—
3153 Systems Architecture & Engineering.....	13	11	19	16	16
3155 TAMD Integration .....	—	—	—	22	35
3157 Environment, Siting, & Facilities .....	10	6	5	—	—
3160 Deployment Planning.....	23	2	—	—	—
3251 System Engineering & Technical Support	44	46	48	34	36
3261 TMD BM/C3I .....	65	48	83	61	41
3265 Joint TMD Warfighter Support .....	18	16	14	17	10
3270 Threat & Countermeasures .....	28	28	30	26	16
3352 Modeling & Simulation .....	87	104	77	66	41
3353 Joint National Test Facility .....	—	—	48	52	56
3354 Targets Support .....	23	22	69	20	44
3359 System Test & Evaluation .....	63	39	39	26	64
3360 Test Resources.....	42	49	75	92	67
4000 Management .....	157	143	140	123	133
Other programs <sup>a</sup> .....	—	35 <sup>r</sup>	—	19	17
<b>TOTAL DETAILED PROJECTS .....</b>	<b>\$3,343</b>	<b>\$3,622</b>	<b>\$3,800</b>	<b>\$4,166</b>	<b>\$3,302</b>

Source: Ballistic Missile Defense Organization.  
a Projects with five year funding under \$20 million herein combined.  
E Estimate. Represents Administration's budget request.  
r Revised.

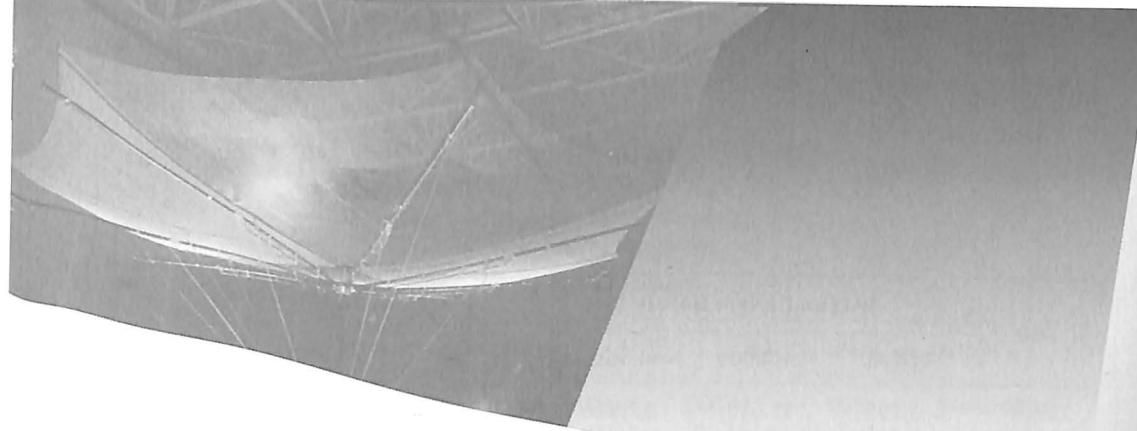
# SPACE PROGRAMS

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Sales of space vehicle systems, at \$14 billion, declined in 1998 from \$14.6 billion—ending a four-year period of growth. Where separable, figures for space vehicle systems exclude engines and propulsion units, which are reported below. Non-military (civil) sales fell less than 1% in 1998 to \$9.6 billion. Military sales of space vehicle systems fell 11% to \$4.4 billion.

Strong civil orders, again excluding engines and propulsion units (where separable), propelled space vehicle systems orders up \$1.9 billion to a record \$17 billion in 1998. Civil orders rose 24% to a record \$13 billion in 1998, whereas military orders declined \$0.6 billion to \$4.0 billion.

The backlog of unfilled orders for space vehicle systems rose \$1.7 billion to a record \$25 billion at the end of 1998. While the military backlog, at \$8.1 billion, declined for the second straight year, the civil backlog grew for the fourth straight year to a record \$16.8 billion.



Sales of engines and propulsion units for missiles and space vehicles declined 1% to \$2.7 billion in 1998. Military sales fell \$62 million to \$0.5 billion. Civil sales of engines and propulsion units, representing 81% of the total, actually rose 1% to \$2.2 billion.

Both civil and military net new orders for engines and propulsion units rose in 1998. Combined orders rose 28%, or \$0.6 billion, to \$2.6 billion. While civil orders contributed the majority of that increase, military orders rose \$178 million to \$655 million.

The military backlog rose 8%, or \$79 million, to \$1.1 billion and the civil backlog declined less than 1%, or \$29 million. Combined, the backlog of unfilled orders for engines and propulsion units rose less than 1% to \$5.6 billion.

Federal outlays for space activities rose in FY 1998 to an estimated \$25.8 billion, according to NASA's annual "Aeronautics and Space Report of the President." This reflects a modest, overall increase from 1997's total of \$25.6 billion. The two largest pieces go to NASA at \$12.9 billion (down from \$13.1 billion the previous year) and DoD at \$12.2 billion (up slightly from \$12.0 billion). Department of Energy's space spending jumped from \$37 million in FY 1997 to \$60 million in FY 1998. Other federal outlays, including Commerce Department funding, grew modestly to \$0.6 billion.

**ORDERS, SALES, AND BACKLOG  
SPACE VEHICLE SYSTEMS<sup>a</sup>**  
Calendar Years 1984–1998  
(Millions of Dollars)

Year	SALES—Current Dollars			SALES—Constant Dollars <sup>b</sup>		
	TOTAL	Military	Non-Military	TOTAL	Military	Non-Military
1984	\$ 5,225	\$3,019	\$2,206	\$ 5,235	\$3,025	\$ 2,210
1985	6,300	4,241	2,059	6,383	4,297	2,086
1986	6,304	4,579	1,725	6,317	4,588	1,728
1987	8,051	5,248	2,803	8,051	5,248	2,803
1988	8,622	6,190	2,432	8,461	6,075	2,387
1989	9,758	6,457	3,301	9,197	6,086	3,111
1990	9,691	6,556	3,135	8,770	5,933	2,837
1991	10,515	6,770	3,745	9,175	5,908	3,268
1992	9,266	5,887	3,379	7,839	4,981	2,859
1993	7,317	4,175	3,142	6,037	3,445	2,592
1994	10,594	5,707	4,887	8,557	4,610	3,947
1995	11,314	4,782	6,532	9,001	3,804	5,196
1996	11,698	5,613	6,085	9,182	4,406	4,776
1997 <sup>r</sup>	14,643	4,919	9,724	11,264	3,784	7,480
1998	14,008	4,360	9,648	10,734	3,341	7,393

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military	Non-Military	TOTAL	Military	Non-Military
1984	\$ 4,984	\$3,385	\$1,599	\$ 4,624	\$3,099	\$ 1,525
1985	8,383	6,083	2,300	6,707	4,941	1,766
1986	7,437	5,666	1,771	8,063	6,028	2,035
1987	11,455	9,000	2,455	12,393	9,460	2,933
1988	7,296	4,561	2,735	10,838	7,880	2,958
1989	11,709	8,107	3,602	13,356	9,192	4,164
1990	9,598	6,256	3,342	12,462	8,130	4,332
1991	11,222	5,468	5,754	11,664	6,221	5,443
1992	10,491	6,773	3,718	12,809	7,622	5,187
1993	8,436	5,106	3,330	13,663	7,384	6,279
1994	9,041	4,896	4,145	12,888	6,732	6,156
1995	13,212	4,679	8,533	15,650	5,872	9,778
1996	16,527	8,888	7,639	23,004	9,125	13,879
1997 <sup>r</sup>	15,078	4,584	10,494	23,189	8,848	14,341
1998	16,976	4,003	12,973	24,920	8,143	16,777

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

a Excludes engines and propulsion units where separable.

b Based on AIA's aerospace composite price deflator, 1987=100.

r Revised.

**ORDERS, SALES, AND BACKLOG  
ENGINES AND PROPULSION UNITS FOR  
MISSILES AND SPACE VEHICLES**

Calendar Years 1984–1998  
(Millions of Dollars)

Year	SALES—Current Dollars			SALES—Constant Dollars <sup>a</sup>		
	TOTAL	Military	Non-Military	TOTAL	Military	Non-Military
1984	\$2,305	\$1,116	\$1,189	\$2,310	\$1,118	\$1,191
1985	2,466	1,256	1,210	2,498	1,273	1,226
1986	2,995	1,796	1,199	3,001	1,800	1,201
1987	2,993	1,563	1,430	2,993	1,563	1,430
1988	3,407	1,830	1,577	3,343	1,796	1,548
1989	3,602	1,771	1,831	3,395	1,669	1,726
1990	3,247	1,911	1,336	2,938	1,729	1,209
1991	3,807	1,869	1,938	3,322	1,631	1,691
1992	3,051	1,577	1,474	2,581	1,334	1,247
1993	3,104	1,619	1,485	2,561	1,336	1,225
1994	2,518	1,123	1,395	2,034	907	1,127
1995	2,364	1,035	1,329	1,881	823	1,057
1996	2,016	635	1,381	1,582	498	1,084
1997 <sup>r</sup>	2,687	558	2,129	2,067	429	1,638
1998	2,651	496	2,155	2,031	380	1,651

Year	NET NEW ORDERS			BACKLOG AS OF DECEMBER 31		
	TOTAL	Military	Non-Military	TOTAL	Military	Non-Military
1984	\$3,770	\$2,258	\$1,512	\$3,156	\$2,194	\$ 962
1985	3,823	1,323	2,500	4,513	2,261	2,252
1986	1,985	1,224	761	3,503	1,689	1,814
1987	3,335	1,995	1,340	3,849	2,121	1,728
1988	3,507	1,623	1,884	3,985	1,998	1,987
1989	6,113	2,475	3,638	6,410	2,595	3,815
1990	2,692	1,891	801	6,230	2,887	3,343
1991	5,661	1,087	4,574	8,422	2,327	6,095
1992	3,124	2,097	1,027	8,310	2,729	5,581
1993	1,708	710	998	6,543	1,903	4,640
1994	1,879	484	1,395	6,035	1,390	4,645
1995	2,805	444	2,361	6,630	1,065	5,565
1996	1,868	745	1,123	5,873	1,108	4,765
1997 <sup>r</sup>	2,009	477	1,532	5,568	1,023	4,545
1998	2,568	655	1,913	5,618	1,102	4,516

Source: Bureau of the Census, "Aerospace Industry (Orders, Sales, and Backlog)" Series MA37D (Annually).

a Based on AIA's aerospace composite price deflator, 1987=100.

r Revised.



## U.S. GOVERNMENT SPACECRAFT RECORD<sup>a</sup>

### Calendar Years 1957–1998

Year	Earth Orbit <sup>b</sup>		Earth Escape <sup>b</sup>		Year	Earth Orbit <sup>b</sup>		Earth Escape <sup>b</sup>	
	Success	Failure	Success	Failure		Success	Failure	Success	Failure
1957	—	1	—	—	1982	21	—	—	—
1958	5	8	—	4	1983	31	—	—	—
1959	9	9	1	2	1984	35	3	—	—
1960	16	12	1	2	1985	37	1	—	—
1961	35	12	—	2	1986	11	4	—	—
1962	55	12	4	1	1987	9	1	—	—
1963	62	11	—	—	1988	16	1	—	—
1964	69	8	4	—	1989	24	—	2	—
1965	93	7	4	1	1990	40	—	1	—
1966	94	12	7	1 <sup>c</sup>	1991	32 <sup>d</sup>	—	—	—
1967	78	4	10	—	1992	26 <sup>d</sup>	—	1	—
1968	61	15	3	—	1993	28 <sup>d</sup>	1	1	—
1969	58	1	8	1	1994	31 <sup>d</sup>	1	1	—
1970	36	1	3	—	1995	24 <sup>d</sup>	2	1	—
1971	45	2	8	1	1996	30 <sup>d</sup>	1	3	—
1972	33	2	8	—	1997 <sup>f</sup>	22	—	1	—
1973	23	2	3	—	1998 <sup>f</sup>	7	—	—	—
1974	27	2	1	—					
1975	30	4	4	—	<b>TOTAL</b>	1,401	149	90	15
1976	33	—	1	—					
1977	27	2	2	—					
1978	34	2	7	—					
1979	18	—	—	—					
1980	16	4	—	—					
1981	20	1	—	—					

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

a Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched on U.S. launch vehicles.

b The criterion of success is attainment of Earth orbit or Earth escape rather than judgement of mission success. "Escape" flights include all that were intended to go at least an altitude equal to the lunar distance from the Earth.

c This Earth-escape failure did attain Earth orbit and therefore is included in the Earth-orbit success totals.

d Excludes commercial satellites.

f Through September 30.

**WORLDWIDE SPACE LAUNCHINGS<sup>a</sup>**  
**WHICH ATTAINED EARTH ORBIT OR BEYOND**  
**Calendar Years 1957–1998**

Country	Total 1957– 1998	1994	1995	1996	1997	1998 <sup>c</sup>
<b>TOTAL</b> .....	3,949	90	76	72	76	55
U.S.S.R. ....	2,563	49	33	25	19	19
United States .....	1,143	26	27	32	37	23
European Space Agency .....	103	6	12	10	11	6
Japan .....	54	2	1	1	2	2
People's Republic of China ...	53	5	2	3	6	5
India .....	10	2	—	1	1	—
Israel .....	3	—	1	—	—	—
Other <sup>b</sup> .....	20	—	—	—	—	—

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

a Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

b Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 1 by Australia, and 1 by the United Kingdom.

c Through September 30.

r Revised.

## U.S. SPACE LAUNCH VEHICLES

As of 1998

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo- newtons)	Maximum Payload (Kg) <sup>a</sup>		
			185-Km Orbit	Geo- synch.- Transfer Orbit	Circular Sun- Synch. Orbit
Pegasus (1990)	1. Orion 50S*	484.9	380	—	210
	2. Orion 50*	118.2	280 <sup>b</sup>		
	3. Orion 38*	31.9			
Pegasus XL (1994) <sup>c</sup>	1. Orion 50S-XL*	743.3	460	—	335
	2. Orion 50-XL*	201.5	350 <sup>b</sup>		
	3. Orion 38*	31.9			
Taurus (1994)	0. Castor 120*	1,687.7	1,400	255	1,020
	1. Orion 50S*	580.5	1,080 <sup>b</sup>		
	2. Orion 50*	138.6			
	3. Orion 38*	31.9			
Delta II 7900 Series (1960; 1990)	1. RS-270/A plus 9 Hercules GEM*	1,043.0 4,388.4	5,089 3,890 <sup>b</sup>	1,842 <sup>d</sup>	3,175
	2. AJ10-118K	42.4			
	3. Star 48B*	66.4			
Delta III (1998) <sup>c</sup>	1. RS-27 plus 9 Alliant GEM*	1,043.0 5,479.2	8,292	3,810	6,768
	2. RL-10B	110.0			
	3. Star 48B*	66.4			
Atlas E (1958; 1968)	1. Atlas MA-3	1,739.5	820 <sup>b</sup> 1,860 <sup>bf</sup>	—	910 <sup>f</sup>
Atlas I (1966; 1990)	1. Atlas MA-5	1,952.0	—	2,255	—
	2. 2 Centaur I	146.8			
Atlas II (1966; 1991)	1. Atlas MA-5A	2,110.0	6,580	2,810	4,300
	2. 2 Centaur II	146.8	5,510 <sup>b</sup>		
Atlas IIA (1966; 1992)	1. Atlas MA-5A	2,110.0	6,828	3,062	4,750
	2. 2 Centaur II	185.1	6,170 <sup>b</sup>		
Atlas IIAS (1966; 1993)	1. Atlas MA-5A plus 4 Castor IV*	2,110.0 1,734.4	8,640 7,300 <sup>b</sup>	3,606	5,800
	2. 2 Centaur II	185.1			

(Continued on next page)

## U.S. SPACE LAUNCH VEHICLES

As of 1998 (Continued)

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg) <sup>a</sup>		
			185-Km Orbit	24-Hour Polar Orbit	Circular Sun-Synch. Orbit
Titan II (1964; 1988)	1. 2 LR-87 2. LR-91	2,090.0 440.0	1,905 <sup>b</sup>	—	—
Titan III (1964; 1989)	0. 2 5 1/2-segment, 3.05-m. dia* 1. 2 LR-87 2. LR-91	12,420.0 2,429.0 462.8	14,515	5,000 <sup>b</sup>	—
† Titan IV (1989)	0. 2 7-segment, 3.05-m. dia* 1. 2 LR-87 2. LR-91	14,000.0 2,429.0 462.8	17,700 14,110 <sup>b</sup>	6,350 <sup>b</sup>	—
Titan IV/Centaur (1994)	0. 2 7-segment, 4.3-m. dia* 1. 2 LR-87 2. LR-91 3. Centaur 4. SRMU	14,000.0 2,429.0 462.5 73.4 7,690.0	—	5,760	—
Space Shuttle (reusable) (1981)	0. 3 main engines (SSMEs) fire in parallel with solid-fueled rocket boosters (SRBs) 1. 2 SRBs mounted on external tank (ET) fire in parallel with SSMEs 2. 2 OMS	5,006.1 23,580.0 53.4	24,900 <sup>h</sup>	5,900 <sup>i</sup>	—

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

\* Solid propellant; all others are liquid.

a Due east launch except as indicated.

b Polar launch.

c First launch was a failure.

d With Star 48B.

f With TE-M-364-4 upper stage.

g With appropriate upper stage.

h In full performance configuration (280–420 km orbit).

i With IUS or TOS.

## FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1961–1998  
(Millions of Current Dollars)

Year	TOTAL	NASA <sup>a</sup>	DoD	Energy	Commerce	Other <sup>b</sup>
1961	\$ 1,468	\$ 694	\$ 710	\$ 64	\$ —	\$ —
1962	2,387	1,226	1,029	130	1	1
1963	4,079	2,517	1,368	181	12	1
1964	5,930	4,131	1,564	220	12	3
1965	6,886	5,035	1,592	232	24	3
1966	7,719	5,858	1,637	188	28	7
1967	7,237	5,337	1,673	184	39	5
1968	6,667	4,595	1,890	147	29	6
1969	6,326	4,078	2,095	118	31	5
1970	5,453	3,565	1,756	103	24	5
1971	4,999	3,171	1,693	97	30	8
1972	4,772	3,195	1,470	60	37	10
1973	4,719	3,069	1,557	51	29	13
1974	4,854	2,960	1,777	39	64	14
1975	4,891	2,951	1,831	34	64	11
1976	5,314	3,336	1,864	26	71	16
Tr.Qtr.	1,361	869	458	8	23	4
1977	5,559	3,600	1,833	22	87	18
1978	6,188	3,582	2,457	29	101	20
1979	6,808	3,744	2,892	55	97	21
1980	7,734	4,340	3,162	49	89	94
1981	9,238	4,877	4,131	47	81	102
1982	10,542	5,463	4,772	60	142	106
1983	12,668	6,101	6,247	40	178	103
1984	14,813	6,461	8,000	33	209	109
1985	17,353	6,607	10,441	34	155	115
1986	18,683	6,756	11,449	35	317	127
1987	21,948	7,254	14,264	37	262	130
1988	23,521	8,451	14,397	199	334	140
1989	25,255	10,195	14,504	97	306	153
1990	25,788	12,292	12,962	79	279	177
1991	28,484	13,351	14,432	251	266	184
1992	27,998	12,838	14,437	223	298	202
1993	27,537	13,092	13,779	165	295	206
1994	23,929	12,363	10,973	83	297	213
1995	24,700	12,593	11,494	70	330	213
1996	24,675	12,694	11,353	46	354	228
1997	25,626	13,055	11,959	37	336	239
1998 <sup>E</sup>	25,832	12,866	12,230	60	342	244

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Excludes amounts for air transportation.

b Departments of Interior, Transportation, and Agriculture, the National Science Foundation, and the Environmental Protection Agency.

E Estimated.

Tr.Qtr. See Glossary.

## FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1961–1998

(Millions of Dollars)

Year	TOTAL	NASA <sup>a</sup>	DoD	Energy	Commerce	Other <sup>b</sup>
1961	\$ 1,809	\$ 926	\$ 814	\$ 68	\$ —	\$ 1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,971	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,340	3,547	1,678	103	8	4
1971	4,740	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	11
1973	4,825	3,093	1,623	54	40	15
1974	4,641	2,759	1,766	42	60	14
1975	4,913	2,915	1,892	30	64	12
1976	5,319	3,225	1,983	23	72	16
Tr.Qtr.	1,341	849	460	5	22	5
1977	5,983	3,440	2,412	22	91	18
1978	6,518	3,623	2,738	34	103	20
1979	7,243	4,030	3,036	59	98	20
1980	8,761	4,680	3,848	40	93	100
1981	10,053	4,992	4,828	41	87	105
1982	12,518	5,528	6,679	61	145	105
1983	15,672	6,328	9,019	39	178	108
1984	17,445	6,858	10,195	34	236	122
1985	20,273	6,925	12,768	34	423	123
1986	21,764	7,165	14,126	35	309	129
1987	26,558	9,809	16,287	48	278	136
1988	26,738	8,322	17,679	241	352	144
1989	28,563	10,097	17,906	97	301	162
1990	27,588	11,460	15,616	79	243	190
1991	27,924	13,046	14,181	251	251	195
1992	28,991	13,199	15,023	223	327	219
1993	27,868	13,064	14,106	165	324	209
1994	26,789	13,022	13,166	74	312	215
1995	23,816	12,543	10,644	60	352	217
1996	24,833	12,569	11,514	46	472	232
1997	24,912	12,457	11,727	35	448	245
1998 <sup>E</sup>	25,448	12,321	12,359	63	456	249

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Excludes amounts for air transportation.

b Departments of Interior, Transportation, and Agriculture, the National Science Foundation, and the Environmental Protection Agency.

E Estimated.

Tr.Qtr. See Glossary.

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1976–2000  
(Millions of Current Dollars)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications <sup>a</sup>	Construction of Facilities	Research & Program Management <sup>b</sup>
1976	\$ 3,669	\$2,749	\$ —	\$121	\$ 799
Tr.Qtr.	951	731	—	26	195
1977	3,945	2,980	—	105	860
1978	3,983	2,989	—	124	870
1979	4,197	3,139	—	133	925
1980	4,852	3,701	—	140	1,010
1981	5,421	4,223	—	147	1,051
1982	6,035	4,796	—	109	1,130
1983	6,664	5,316	—	108	1,240
1984	7,048	2,792 <sup>a</sup>	2,915	109	1,232
1985	7,318	2,118	3,707	170	1,323
1986	7,404	2,615	3,267	189	1,332
1987	7,591	2,436	3,597	149	1,409
1988	9,092	2,916	4,362	166	1,648
1989	11,052	3,922	5,030	190	1,909
1990	12,429	5,094	5,117	218	2,000
1991	13,878	5,765	5,590	326	2,196
1992	13,961	6,579	5,118	463	1,802
1993	14,305	7,086	5,025	557	1,638
1994	13,695	6,758	4,899	371	1,666
1995 <sup>c</sup>	5,098	3,286	1,409	305	98
1996 <sup>c</sup>	1,022	510	241	265	6
1997 <sup>c</sup>	317	101	92	122	2
1998 <sup>c</sup>	138	40	34	64	—
1999 <sup>cE</sup>	44	20	10	14	—
2000 <sup>cE</sup>	100	44	12	44	—

Year	TOTAL	Science, Aeronautics, & Technology	Human Space Flight	Other <sup>b</sup>	Mission Support
1995 <sup>c</sup>	\$ 8,280	\$2,708	\$3,528	\$ 15	\$2,029
1996 <sup>c</sup>	12,858	5,017	5,452	16	2,373
1997 <sup>c</sup>	14,043	5,891	5,656	19	2,477
1998 <sup>c</sup>	14,068	6,015	5,551	19	2,483
1999 <sup>cE</sup>	13,999	5,866	5,526	21	2,586
2000 <sup>cE</sup>	13,257	5,287	5,528	21	2,421

Source: Office of Management and Budget, "Budget of the United States Government" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Separate budget category beginning in 1984; funds formerly included under Research and Development.

b Includes trust funds, Office of Inspector General, & GSA building delegation.

c 1995 featured major budget account restructuring. Note: 1995–2000 outlays split between old and new account structure.

E Estimate. Latest year reflects Administration's budget proposal.

Tr.Qtr. See Glossary.

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**  
**BUDGET AUTHORITY**  
 Fiscal Years 1971–2000  
 (Millions of Current Dollars)

Year	TOTAL	Research and Development	Space Flight Control and Data Communications <sup>a</sup>	Construction of Facilities	Research & Program Management <sup>b</sup>
1971	\$ 3,312	\$2,556	\$ —	\$ 26	\$ 730
1972	3,308	2,523	—	53	732
1973	3,408	2,599	—	79	730
1974	3,040	2,194	—	101	745
1975	3,231	2,323	—	143	765
1976	3,552	2,678	—	82	792
Tr.Qtr.	932	700	—	11	221
1977	3,819	2,856	—	118	845
1978	4,064	3,012	—	162	890
1979	4,559	3,477	—	148	934
1980	5,243	4,088	—	159	996
1981	5,522	4,334	—	117	1,071
1982	6,020	4,772	—	114	1,134
1983	6,875	5,539	—	139	1,197
1984	7,316	2,064 <sup>a</sup>	3,772	223	1,256
1985	7,573	2,468	3,594	178	1,332
1986	7,807	2,619	3,670	176	1,342
1987	10,923	3,154	6,100	217	1,453
1988	9,062	3,280	3,806	213	1,763
1989	10,969	4,213	4,555	275	1,927
1990	12,324	5,225	4,645	218	2,023
1991	14,016	6,024	5,271	498	2,212
1992	14,317	6,848	5,352	525	1,576
1993	14,310	7,074	5,059	526	1,652
1994	14,570	7,534	4,835	493	1,708
Year	TOTAL	Science, Aeronautics, & Technology	Human Space Flight	Other <sup>b</sup>	Mission Support
1995 <sup>c</sup>	\$13,854	\$5,936	\$5,515	\$(130)	\$2,533
1996	13,886	5,929	5,457	17	2,483
1997	13,711	5,590	5,540	19	2,562
1998	13,649	5,690	5,560	19	2,380
1999 <sup>E</sup>	13,666	5,654	5,480	21	2,511
2000 <sup>E</sup>	13,580	5,425	5,638	22	2,495

Source: Office of Management and Budget. "Budget of the United States Government" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Separate budget category beginning in 1984; funds formerly included under Research and Development.

b Includes trust funds, Office of the Inspector General, & GSA building delegation.

c 1995 features major budget account restructuring.

E Estimate. Latest year reflects Administration's budget proposal.

Tr.Qtr. See Glossary.



**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
BUDGET AUTHORITY BY MAJOR BUDGET ACCOUNT  
FOR SELECTED PROGRAMS**

Fiscal Years 1998–2000  
(Millions of Dollars)

	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
<b>HUMAN SPACE FLIGHT</b> .....	\$5,560	\$5,480	\$5,638
International Space Station .....	\$2,331	\$2,305	\$2,483
U.S.-Russian Cooperative Space Activities.....	110	—	—
<b>Space Shuttle—Total</b> .....	<u>2,913</u>	<u>2,998</u>	<u>2,986</u>
Shuttle Operations .....	2,344	2,427	2,547
Safety/Performance Upgrades .....	568	572	439
Payload & Utilization Operations .....	205	177	169
<b>SCIENCE, AERONAUTICS, &amp; TECHNOLOGY</b> .....	\$5,690	\$5,654	\$5,425
Space Science.....	\$2,044	\$2,119	\$2,197
Life & Microgravity Sciences & Applications .....	214	264	256
Earth Science .....	1,417	1,414	1,459
Aeronautics & Space Transportation Technology .....	1,484	1,339	1,007
Mission Communication Services .....	401	380	406
Academic Programs .....	130	139	100
<b>MISSION SUPPORT</b> .....	\$2,380	\$2,511	\$2,495
Safety, Mission Assurance, Engineering & Advanced Concepts .....	\$ 38	\$ 36	\$ 43
Space Communication Services .....	194	186	90
Research & Program Management .....	2,026	2,121	2,181
Construction of Facilities .....	122	169	181
<b>INSPECTOR GENERAL</b> .....	\$ 18	\$ 20	\$ 21

Source: "NASA Budget Briefing Background Material" (Annually).

Note: Detail may not add to totals because of rounding.

E Estimate. Latest year reflects Administration's budget proposal.

**DEPARTMENT OF DEFENSE SPACE PROGRAMS  
PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E**

Fiscal Years 1998, 1999, and 2000  
(Millions of Dollars<sup>a</sup>)

Agency and Program	1998		1999 <sup>E</sup>		2000 <sup>E</sup>	
	Pro- cure- ment	RDT&E	Pro- cure- ment	RDT&E	Pro- cure- ment	RDT&E
<b>AIR FORCE</b>						
Defense Support Program...	\$ 85.8	\$ 17.6	\$ 88.7	\$ 11.8	\$111.6	\$ 7.5
EELV.....	—	23.3	—	259.1	70.8	324.8
Medium Launch Vehicles ...	195.5	2.0	175.1	7.3	64.9	1.2
Milstar .....	—	609.7	—	546.5	—	361.3
NAVSTAR GPS .....	162.6	96.4	93.6	94.4	170.9	98.9
SBIRS-Low .....	—	213.5	—	192.2	—	229.0
SBIRS-High .....	—	337.9	—	539.4	—	328.7
Space Based Laser <sup>b</sup> .....	118.3	—	125.0	33.8	75.0	63.8
Titan Launch Vehicles .....	453.3	62.4	583.8	77.2	431.3	45.4
<b>ARMY</b>						
DSCS .....	\$ 88.1	\$ 13.8	\$110.2	\$ 16.1	\$ 80.3	\$ 9.0

Source: Department of Defense, "Program Acquisition Costs by Weapon System" (Annually).

a Total Obligational Authority.

b Air Force and BMDO funding.

E Estimate. Latest year reflects Administration's budget proposal.

NA Not available.

KEY: DSCS = Defense Satellite Communications System

EELV = Evolved Expendable Launch Vehicle

GPS = Global Positioning System

SBIRS = Space-Based InfraRed System

□

# AIR TRANSPORTATION

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The International Civil Aviation Organization (ICAO) reported that the operating revenues of the world's scheduled air carriers rose 2.6% to nearly \$300 billion in 1998. With operating expenses of \$282 billion, ICAO airlines generated a record operating profit of \$16.5 billion and a record net result of \$9 billion. Revenue growth slowed significantly from 1996, when operating revenues increased 5.8%, due in part to the economic crisis that began in Asia in 1997 and then spread globally in 1998. ICAO reported enplanements leveled off at 1.46 billion passengers in 1998 after five years of growth and freight tons carried declined after seven years of growth.

Asia's economic downturn also impacted U.S. air carrier revenue and profit. Revenue from international operations declined in 1998 following 16 years of uninterrupted growth and profit from international operations fell by nearly half. Revenues from international operations fell 1.6% to \$26.9 billion despite 2% traffic growth. Revenue passenger load factor for international operations fell from 74.1% to 72.8% in 1998. Increased capacity and aircraft re-deployed from



Asian service into North Atlantic service resulted in lower fares. Profit from international operations declined \$918 million to \$1.15 billion during 1998.

Domestic operations of U.S. air carriers, on the other hand, reflected the strength of the U.S. economy. Passenger enplanements rose 19 million to 561 billion. Load factor increased to 70.2% as revenue passenger miles grew 3% while available seat miles rose just 1.4%. Revenues from domestic operations grew 5.8% to \$87 billion as expenses rose 4.2% to \$79 billion. The result was a record \$8.1 billion operating profit from domestic operations. When combined with international operations, U.S. air carriers posted a record \$9.3 billion operating profit. Total revenues rose \$4.3 billion to a record \$114 billion and expenses rose \$3.6 billion to \$105 billion in 1998.

The number of turbine-engined aircraft in airline service totaled just over 23,000, according to Exxon International Company's annual "Air World Survey." The turbine fleet grew—as it has every year since at least 1972—by 892 aircraft during 1998. U.S. manufacturers produced 57%, or 13,139, of the world's active fleet. The turbojet fleet grew by nearly 600, while the number of turboprops declined from 7,072 to 7,010—perhaps reflecting airline passenger preference for jet aircraft. U.S. manufacturers produced 69% of the 14,621 jet aircraft in service. Turbine-powered helicopters in airline service rose 35% to 1,371.

The U.S. air carrier fleet grew by nearly 500 aircraft in 1998 to 8,111. The turbojet fleet grew by just over 300 aircraft, or 6%, to 5,412. The U.S. fleet of turboprops grew—in contrast the world's decline—nearly 200 to 1,851, according to data from the Federal Aviation Administration.

## OPERATING REVENUES AND EXPENSES OF WORLD SCHEDULED AIRLINES<sup>a</sup>

Calendar Years 1995–1998  
(Millions of U.S. Dollars)

	1995	1996 <sup>r</sup>	1997	1998 <sup>p</sup>
<b>OPERATING REVENUES:</b>				
Scheduled Services:				
Passenger .....	\$205,000	\$216,710	\$221,820	
Freight .....	25,980	27,830	29,720	
Mail .....	<u>2,680</u>	<u>2,490</u>	<u>2,530</u>	
Total Scheduled Services .....	\$233,660	\$247,030	\$254,070	NA
Non-Scheduled Services .....	10,680	11,740	11,250	
Incidental .....	<u>22,660</u>	<u>23,730</u>	<u>25,680</u>	
<b>Total Operating Revenues</b> .....	<b>\$267,000</b>	<b>\$282,500</b>	<b>\$291,000</b>	<b>\$298,500</b>
<b>OPERATING EXPENSES:</b>				
Flight Operations .....	\$ 66,550	\$ 74,810	\$ 76,390	
Maintenance & Overhaul .....	26,810	28,540	30,310	
Depreciation & Amortization ...	18,400	19,100	17,990	
User Charges & Station Expenses .....	46,140	47,920	47,690	NA
Passenger Services .....	28,070	29,090	29,310	
Ticketing, Sales & Promotion ...	39,590	41,320	40,700	
General, Administrative & Other	<u>27,940</u>	<u>29,420</u>	<u>32,310</u>	
<b>Total Operating Expenses</b> .....	<b>\$253,500</b>	<b>\$270,200</b>	<b>\$274,700</b>	<b>\$282,000</b>
<b>OPERATING RESULT</b> .....	<b>\$ 13,500</b>	<b>\$ 12,300</b>	<b>\$ 16,300</b>	<b>\$ 16,500</b>
Percent of Revenue.....	5.1%	4.4%	5.6%	5.5%
<b>NET RESULT<sup>b</sup></b> .....	<b>\$ 4,500</b>	<b>\$ 5,300</b>	<b>\$ 8,550</b>	<b>\$ 9,000</b>
Percent of Revenue.....	1.7%	1.9%	2.9%	3.0%

Source: International Civil Aviation Organization, "Civil Aviation Statistics of the World" (Annually).

a Excludes domestic operations in the Commonwealth of Independent States.

b Net Result equals Operating Result minus non-operating items, including interest, income taxes, retirement of property and equipment, affiliated companies, and subsidies.

NA Not available.

p Preliminary.

r Revised.

(f) Denotes loss.

## TRAFFIC STATISTICS WORLD AIRLINE SCHEDULED SERVICE<sup>a</sup>

Calendar Years 1970-1998

Year	Passen- gers Carried	Freight Tons Carried	Passen- ger- Miles Per- formed	Seat- Miles Avail- able	Passen- ger Load Factor	Ton-Miles Performed		
						Freight	Mail	TOTAL (Passen- gers & Baggage, Freight, Mail)
						(Millions)	(Billions)	(Percent)
1970	383	6.7	286	522	55 %	8,230	2,100	38,820
1971	411	7.4	307	568	54	9,060	1,990	41,420
1972	450	8.0	348	609	57	10,290	1,900	46,690
1973	489	9.1	384	667	58	12,010	1,970	51,910
1974	515	9.5	408	688	59	13,030	1,980	55,270
1975	534	9.6	433	733	59	13,270	1,990	58,080
1976	576	10.3	475	789	60	14,750	2,080	63,880
1977	610	11.1	508	837	61	16,190	2,170	68,790
1978	679	11.7	582	902	65	17,770	2,240	77,770
1979	754	12.1	659	999	66	19,190	2,350	86,890
1980	748	12.2	677	1,071	63	20,120	2,520	89,720
1981	752	12.0	695	1,092	64	21,150	2,600	92,810
1982	766	12.8	710	1,115	64	21,600	2,650	94,840
1983	798	13.5	739	1,151	64	24,050	2,740	100,280
1984	848	14.8	794	1,226	65	27,170	2,950	109,050
1985	899	15.1	850	1,293	66	27,290	3,010	114,860
1986	960	16.2	902	1,389	65	29,580	3,110	122,470
1987	1,028	17.7	988	1,471	67	33,100	3,220	134,570
1988	1,082	19.0	1,060	1,568	68	36,480	3,310	145,290
1989	1,109	19.9	1,102	1,621	68	39,140	3,460	152,730
1990	1,165	20.3	1,177	1,740	68	40,270	3,650	161,120
1991	1,135	19.3	1,147	1,727	66	40,110	3,480	158,030
1992	1,146	19.5 <sup>r</sup>	1,199	1,821	66	42,900	3,510	165,850
1993	1,142	19.9	1,211	1,872	65	46,880	3,580	171,660
1994	1,233	22.6	1,305	1,969	66	52,890	3,710	187,280
1995	1,304	24.5	1,397	2,087	67	56,940	3,860	201,320 <sup>r</sup>
1996 <sup>r</sup>	1,391	25.6	1,511	2,214	68	61,100	3,970	217,230
1997	1,457	29.1	1,599	2,316	69	70,470	4,100	235,750
1998 <sup>p</sup>	1,462	28.8	1,634	2,381	69	70,050	3,940	238,890

Source: International Civil Aviation Organization (ICAO).

<sup>a</sup> Includes international and domestic traffic on scheduled service performed by the airlines of the 185 states which were members of ICAO in 1998.

<sup>p</sup> Preliminary.

<sup>r</sup> Revised.

## OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS<sup>a</sup> DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1964–1998  
(Millions of Dollars)

Year	TOTAL OPERATIONS <sup>b</sup>			Domestic Operations			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1964	\$ 4,251	\$ 3,781	\$ 470	\$ 3,169	\$ 2,849	\$ 320	\$ 1,082	\$ 932	\$ 150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,903	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	69
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982	36,066	36,804	(739)	28,728	29,478	(750)	6,435	6,452	(17)
1983	38,593	38,231	362	31,014	31,186	(171)	7,163	6,693	470
1984	44,060	41,946	2,114	35,394	33,812	1,582	7,975	7,485	490
1985	48,580	47,207	1,372	37,629	36,611	1,018	8,302	7,984	319
1986	50,086	48,855	1,231	41,001	39,984	1,060	8,621	8,458	163
1987	56,787	54,339	2,448	45,658	43,925	1,733	10,925	10,226	698
1988	63,679	60,236	3,443	50,187	47,739	2,448	13,402	12,403	998
1989	69,225	67,413	1,812	54,314	52,460	1,855	14,911	14,954	(43)
1990	75,984	77,898	(1,913)	57,994	58,983	(989)	17,990	18,914	(924)
1991	75,158	76,943	(1,785)	56,230	56,758	(528)	18,928	20,185	(1,257)
1992	78,140	80,585	(2,444)	57,654	58,801	(1,147)	20,486	21,784	(1,298)
1993	84,559	83,121	1,438	63,233	61,157	2,076	21,326	21,964	(637)
1994	88,313	85,600	2,713	65,949	63,758	2,191	22,364	21,842	522
1995	94,318	88,455	5,863	70,885	66,120	4,765	23,433	22,335	1,098
1996	101,937	95,728	6,209	76,891	71,573	5,317	25,047	24,155	892
1997	109,568	100,981	8,587	82,250	75,731	6,518	27,318	25,250	2,068
1998 <sup>p</sup>	113,907	104,632	9,275	87,012	78,888	8,124	26,895	25,744	1,151

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).

NOTE: Detail may not add to totals because of rounding.

a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

b For 1980 and subsequent years, includes 'Other' operations not reported as 'Domestic' or 'International.'

p Preliminary.

## U.S. AIR CARRIERS TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1969–1998  
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment & Other <sup>a</sup>	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Owned Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1969	\$ 12,069	\$ 9,943	\$ 1,516	\$ 3,560	\$ 7,899	65.4%
1970	12,913	10,950	1,951	4,120	8,782	68.0
1971	12,998	11,221	2,028	4,649	8,600	66.2
1972	13,635	11,918	2,225	5,115	9,028	66.2
1973	14,464	12,908	2,424	5,693	9,639	66.6
1974	15,200	13,538	2,539	6,252	9,826	64.6
1975	15,064	14,035	2,635	6,823	9,847	65.4
1976	15,454	14,399	2,792	7,585	9,605	62.2
1977	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233	52.7
1981	30,513	22,375	5,175	11,028	16,521	54.1
1982	31,525	23,786	5,424	11,405	17,804	56.5
1983	35,213	26,588	6,191	12,910	19,868	56.4
1984	36,769	28,509	6,061	14,043	20,527	55.8
1985	40,978	30,402	6,772	15,467	21,707	53.0
1986	47,105	31,750	8,468	14,764	25,454	54.0
1987	51,436	33,177	9,223	15,580	26,820	52.1
1988	56,047	35,781	10,248	17,450	28,579	51.0
1989	62,454	38,812	11,903	19,018	31,697	50.8
1990	67,769	40,215	13,523	20,593	33,144	48.9
1991	70,332	42,897	14,285	22,009	35,173	50.0
1992	75,426	48,563	15,219	24,445	39,337	52.2
1993	82,399	51,513	15,438	24,949	42,003	51.0
1994	84,442	51,951	15,844	26,476	41,319	48.9
1995	89,782	56,018	16,804	29,056	43,766	48.7
1996	95,184	59,206	16,661	30,029	45,838	48.2
1997	105,226	66,523	17,643	32,789	51,377	48.8
1998 <sup>p</sup>	117,989	75,070	19,964	35,912	59,122	50.1

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).

a Includes land and construction in progress.

p Preliminary.



## SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS<sup>a</sup> DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1984-1998

(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service <sup>b</sup>	Mail	Freight <sup>b</sup> & Air Express	Excess Baggage	Other <sup>c</sup>
<b>DOMESTIC OPERATIONS</b>						
1984	\$35,393	\$31,437	\$ 552	\$1,716	\$ 70	\$ 1,618
1985	37,629	33,343	733	1,581	78	1,895
1986	41,001	33,814	679	4,278	85	2,159
1987	45,658	37,492	704	4,952	67	2,443
1988	50,187	41,002	789	5,807	72	2,518
1989	54,314	43,670	767	5,408	70	4,399
1990	57,994	46,282	747	4,276	76	6,613
1991	56,230	44,594	734	4,487	78	6,337
1992	57,654	45,246	937	4,655	87	6,729
1993	63,233	49,289	974	5,266	91	7,612
1994	65,949	50,504	971	5,844	98	8,531
1995	70,885	53,971	1,050	6,546	92	9,227
1996	76,891	59,381	1,024	7,029	94	9,362
1997	82,250	62,549	1,087	7,497	99	11,017
1998 <sup>P</sup>	87,012	64,843	1,972	7,726	110	12,361
<b>INTERNATIONAL OPERATIONS</b>						
1984	\$ 7,975	\$ 6,074	\$ 158	\$1,169	\$ 27	\$ 546
1985	8,302	6,451	161	1,130	28	532
1986	8,621	6,551	154	1,451	28	437
1987	10,925	8,374	180	1,783	33	555
1988	13,402	10,357	183	2,150	39	672
1989	14,911	11,181	188	2,417	47	1,078
1990	17,990	13,468	223	2,602	43	1,654
1991	18,928	14,103	223	3,134	50	1,419
1992	20,486	15,664	247	2,980	47	1,547
1993	21,326	15,915	237	3,220	49	1,905
1994	22,364	16,300	212	3,606	46	2,201
1995	23,433	16,788	216	3,994	48	2,387
1996	25,047	17,337	255	4,664	47	2,743
1997	27,318	18,320	275	5,156	56	3,511
1998 <sup>P</sup>	26,895	17,666	215	5,270	50	3,693

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).

NOTE: Detail may not add to totals because of rounding.

- a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.
- b Scheduled and charter.
- c Includes subsidy, reservation cancellation fees, miscellaneous operating revenues, and other transport-related revenues.
- p Preliminary.

**OPERATING EXPENSES OF U.S. AIR CARRIERS<sup>a</sup>**  
**DOMESTIC AND INTERNATIONAL OPERATIONS**

Calendar Years 1984–1998

(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Opera- tions	Mainte- nance	Passen- ger Service	Aircraft & Traffic Ser- vicing	Promo- tion and Sales	Depreci- ation & Amorti- zation	Other <sup>b</sup>
<b>DOMESTIC OPERATIONS</b>								
1984	\$33,812	\$12,161	\$ 3,176	\$3,192	\$ 5,369	\$ 5,310	\$2,223	\$ 2,380
1985	36,611	12,684	3,604	3,464	5,781	6,089	2,318	2,670
1986	39,934	11,368	4,475	3,793	7,680	6,820	2,652	3,171
1987	43,925	12,509	4,951	4,169	8,575	7,399	2,855	3,468
1988	47,739	13,176	5,643	4,444	9,527	8,235	2,977	3,737
1989	52,460	14,749	6,184	4,775	9,449	8,718	3,078	5,507
1990	58,983	18,166	6,921	5,220	9,094	9,102	3,273	7,207
1991	56,758	16,831	6,682	5,068	9,140	8,856	3,217	6,964
1992	58,801	17,203	6,884	5,327	9,783	8,936	3,340	7,328
1993	61,157	17,622	7,025	5,241	10,172	9,387	3,621	8,089
1994	63,758	17,912	7,312	5,305	10,543	9,882	3,782	9,023
1995	66,120	18,926	7,656	5,281	11,103	9,974	3,762	9,417
1996	71,573	21,515	8,292	5,577	11,569	10,414	3,878	10,328
1997	75,731	22,156	9,475	5,854	12,058	10,780	3,940	11,469
1998 <sup>P</sup>	78,888	21,156	10,383	6,252	12,736	10,733	4,168	13,461
<b>INTERNATIONAL OPERATIONS</b>								
1984	\$ 7,485	\$ 2,629	\$ 677	\$ 749	\$ 975	\$ 1,308	\$ 446	\$ 701
1985	7,984	2,738	768	852	1,069	1,414	482	662
1986	8,458	2,402	901	877	1,386	1,665	518	711
1987	10,226	2,836	1,096	1,059	1,749	2,094	533	860
1988	12,403	3,230	1,332	1,280	2,193	2,742	618	1,009
1989	14,954	3,919	1,724	1,454	2,483	3,108	746	1,520
1990	18,878	5,454	2,051	1,738	2,657	3,833	887	2,295
1991	20,185	5,636	2,152	1,861	2,831	4,602	892	2,210
1992	21,784	5,843	2,148	2,204	3,255	5,229	1,033	2,073
1993	21,964	5,928	1,967	2,175	3,072	5,339	1,077	2,406
1994	21,842	5,842	2,064	2,311	3,336	4,335	1,237	2,716
1995	22,335	6,181	2,273	2,467	3,748	3,527	1,106	3,033
1996	24,155	7,279	2,616	2,596	3,736	3,354	1,483	3,091
1997	25,250	7,462	2,899	2,736	3,823	3,476	1,281	3,571
1998 <sup>P</sup>	25,744	7,174	2,965	2,920	3,983	3,374	1,441	3,887

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Financial Statistics Quarterly" (Quarterly).

NOTE: Detail may not add to totals because of rounding.

a Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

b General and administrative and other transport-related expenses.

p Preliminary.

**TRAFFIC STATISTICS**  
**U.S. AIR CARRIER SCHEDULED SERVICE<sup>a</sup>**  
 Calendar Years 1964–1998

Year	Revenue Ton-Miles (Millions)			Total Available Ton-Miles (Millions)	Total Revenue Load Factor	Aircraft Revenue Miles (Millions)	Average Overall Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passen- ger	Cargo <sup>b</sup>	Total					
1964	5,630	1,803	7,434	15,514	47.9%	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,964	6,886	32,850	62,401	52.6	2,699	544	167
1983	28,183	7,573	35,756	65,385	54.7	2,809	558	169
1984	30,512	8,185	38,697	72,223	53.6	3,134	575	168
1985	33,640	7,689	41,329	76,059	54.3	3,320	569	168
1986	36,655	9,026	45,681	85,140	53.7	3,725	580	168
1987	40,453	10,016	50,469	92,209	54.7	3,988	606	167
1988	42,330	11,469	53,800	97,899	55.0	4,141	618	169
1989	43,271	12,187	55,458	100,082	55.4	4,193	633	169
1990	45,793	12,549	58,342	107,559	54.2	4,491	649	170
1991	44,795	12,130	56,925	105,599	53.9	4,416	651	169
1992	47,855	13,199	61,054	112,749	54.2	4,661	661	169
1993	48,968	14,120	63,088	115,473	54.6	4,846	669	166
1994	51,938	16,052	67,989	120,798	56.3	5,033	668	163
1995	54,066	16,921	70,987	126,154	56.3	5,293	657	160
1996	57,866	17,754	75,621	131,381	57.6	5,501	668	160
1997 <sup>r</sup>	60,342	20,510	80,852	137,544	58.8	5,659	696	160
1998	61,946	20,476	82,422	141,696	58.2	5,840	703	158

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Traffic Statistics Monthly" (Monthly).

NOTE: Detail may not add to totals because of rounding.

a Includes international and domestic operations.

b Includes freight, air express, U.S. and foreign mail.

r Revised.

**PASSENGER STATISTICS**  
**U.S. AIR CARRIER SCHEDULED SERVICE**  
**DOMESTIC AND INTERNATIONAL OPERATIONS**  
 Calendar Years 1984–1998

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor <sup>a</sup>
<b>DOMESTIC OPERATIONS</b>					
1984	321,047	759	243,692	422,507	57.7
1985	357,109	758	270,584	445,826	60.7
1986	393,864	767	302,090	497,991	60.7
1987	416,831	779	324,637	526,958	61.6
1988	419,210	786	329,309	536,663	61.4
1989	416,331	793	329,975	530,079	62.3
1990	423,565	803	340,231	563,065	60.4
1991	412,360	806	332,566	543,638	61.2
1992	431,693	806	347,931	557,989	62.4
1993	443,172	799	354,177	571,489	62.0
1994	481,755	787	378,990	585,438	64.7
1995	499,000	791	394,708	603,917	65.4
1996	530,708	802	425,596	626,389	67.9
1997 <sup>r</sup>	542,001	817	442,640	640,319	69.1
1998	560,936	813	455,799	649,442	70.2
<b>INTERNATIONAL OPERATIONS</b>					
1984	23,636	2,599	61,424	92,817	66.2
1985	24,913	2,642	65,819	101,963	64.6
1986	25,082	2,570	64,456	109,445	58.9
1987	30,847	2,588	79,834	121,763	65.6
1988	35,404	2,655	93,992	140,140	67.1
1989	37,361	2,750	102,739	154,297	66.6
1990	41,995	2,803	117,695	170,310	69.1
1991	39,941	2,889	115,389	171,561	67.3
1992	43,415	3,009	130,622	194,784	67.1
1993	45,348	2,988	135,508	200,151	67.7
1994	47,093	2,981	140,391	198,893	70.6
1995	48,773	2,992	145,948	203,160	71.8
1996	50,526	3,029	153,067	208,682	73.3
1997 <sup>r</sup>	52,724 <sup>r</sup>	3,049	160,779	216,913	74.1
1998	53,232	3,074	163,656	224,728	72.8

Source: Department of Transportation, Office of Aviation Statistics, "Air Carrier Traffic Statistics Monthly" (Monthly).

<sup>a</sup> Revenue passenger miles as a percent of available seat miles.

<sup>r</sup> Revised.

**TURBINE-ENGINEED AIRCRAFT IN THE WORLD AIRLINE FLEET**

(By Model, 1994–1998)

	1994	1995 <sup>a</sup>	1996 <sup>a</sup>	1997 <sup>a</sup>	1998 <sup>a</sup>
<b>TOTAL AIRCRAFT IN SERVICE</b>	18,347	20,041	21,127	22,110	23,002
<b>Turbojets—TOTAL</b> .....	<b>12,000</b>	<b>12,810</b>	<b>13,425</b>	<b>14,024</b>	<b>14,621</b>
Aerospatiale SE-210 Caravelle	28	27	20	12	12
Airbus A300.....	391	414	405	397	383
Airbus A310.....	217	218	222	224	227
Airbus A319.....	—	—	18	66	118
Airbus A320.....	463	510	549	612	685
Airbus A321.....	17	35	52	72	109
Airbus A330.....	10	38	49	63	87
Airbus A340.....	44	60	86	119	138
Antonov 72/74 .....	—	4	8	8	9
Antonov 124 .....	13	11	16	16	18
Antonov 225 .....	—	—	1	1	1
Avro RJ-70/85/100 .....	30	51	77	100	120
B.Ae./Aerospatiale Concorde	13	13	13	13	13
B.Ae. 146 .....	196	204	206	208	206
B.Ae. One-Eleven .....	120	112	121	122	105
B.Ae. Trident .....	9	—	—	—	—
B.Ae. (HS) 125 .....	22	19	20	18	17
Beech 400 Beechjet .....	2	2	3	3	3
Boeing 707/720 .....	151	123	122	112	98
Boeing 727 .....	1,373	1,346	1,363	1,322	1,263
Boeing 737 .....	2,476	2,569	2,623	2,752	2,968
Boeing 747 .....	957	963	996	1,040	1,042
Boeing 757 .....	629	697	718	770	818
Boeing 767 .....	550	580	628	663	710
Boeing 777 .....	—	13	45	111	174
Canadair CL-601 Challenger...	2	2	2	2	2
Canadair Regional Jet.....	49	83	136	189	258
Cessna Citation I/II/III .....	36	44	45	41	35
Convair 880/990.....	1	—	—	—	—
Dassault Falcon 10/20/50 .....	60	66	65	60	61
Dassault Mercure .....	5	—	—	—	—
Embraer RJ135/RJ145 .....	—	—	—	34	91
Fokker F-28 Fellowship .....	185	185	175	184	160
Fokker 70.....	—	23	34	36	42
Fokker 100 .....	253	267	272	274	278
Gulfstream II/III/IV G-1159 ...	16	15	16	16	14
Ilyushin IL-62 .....	84	106	105	105	86
Ilyushin IL-76 .....	154	209	238	227	215
Ilyushin IL-86 .....	37	51	98	80	75
Ilyushin IL-96 .....	5	5	7	7	7
Israel Aircraft 1121/1124 .....	13	13	11	11	18
Learjet .....	39	49	54	53	49
Lockheed L-1011 Tristar .....	208	190	190	169	156
Lockheed L-1329 Jetstar.....	4	3	3	1	1
MBB Hansa HFB-320.....	3	13	16	16	17
McDonnell Douglas DC-8.....	270	274	263	257	261
McDonnell Douglas DC-9.....	791	787	785	759	749
McDonnell Douglas DC-10 ...	347	335	351	345	354
McDonnell Douglas MD-11 ...	127	146	159	171	180

(Continued on next page)

## TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

(By Model, 1994–1998, continued)

	1994	1995 <sup>a</sup>	1996 <sup>a</sup>	1997 <sup>a</sup>	1998 <sup>a</sup>
<b>Turbojets (continued)</b>					
McDonnell Douglas MD-80 .....	989	1,115	1,120	1,142	1,154
McDonnell Douglas MD-90 .....	—	14	36	62	97
Tupolev Tu-134 .....	155	192	188	189	189
Tupolev Tu-154 .....	283	379	422	451	438
Tupolev Tu-204 .....	5	4	6	6	7
Yakovlev Yak-40/42 .....	168	231	267	313	303
<b>Turbine-Powered</b>					
<b>Helicopters—TOTAL .....</b>	<b>295</b>	<b>774</b>	<b>851</b>	<b>1,014</b>	<b>1,371</b>
Aerospatiale SA-315 Lama .....	—	2	2	2	2
Aerospatiale SA-316 Alouette III .....	—	3	5	5	5
Aerospatiale SA-318 Alouette II .....	1	1	2	1	1
Aerospatiale (Nurtanio) SA-330 Puma .....	17	22	20	20	18
Aerospatiale AS-332 Super Puma .....	16	69	70	78	73
Aerospatiale AS-350 Ecureuil/ Astar .....	4	40	49	104	112
Aerospatiale AS-355 Ecureuil 2/ Twinstar .....	8	15	15	15	23
Aerospatiale SA-365 Dauphin II .....	17	24	25	26	26
Agusta A109 .....	1	1	1	—	—
Bell (Agusta/Fuji) 204 .....	2	5	4	4	2
Bell 205 .....	1	19	16	14	11
Bell 206 Jetranger/Longranger ...	54	145	155	151	361
Bell 212 .....	21	105	106	101	112
Bell 214 .....	4	12	11	7	17
Bell 222 UT .....	1	1	2	2	3
Bell 230 .....	—	—	—	—	3
Bell 407 .....	—	—	—	1	44
Bell 412 .....	16	25	25	31	55
Boeing 107 .....	—	16	16	15	15
Boeing Vertol BV-234 .....	—	9	10	9	9
Hughes (Kawasaki) 500/369D ...	—	12	12	17	16
Kamov Ka-26 .....	—	—	—	16	16
Kamov Ka-32 .....	—	2	2	2	—
MBB BK-117 .....	—	2	2	2	13
MBB/Nurtanio Bo.105 .....	41	58	58	67	103
Mil Mi-2 .....	—	—	24	40	32
Mil Mi-6 .....	—	—	—	6	6
Mil Mi-8 .....	17	18	48	91	83
Mil Mi-14 .....	—	—	1	1	1
Mil Mi-26 .....	—	—	—	7	7
Sikorsky S-55T .....	5	4	6	6	6
Sikorsky S-58T .....	1	1	1	2	1
Sikorsky S-61 .....	42	81	82	90	65
Sikorsky S-62 .....	1	1	1	1	1
Sikorsky S-64 .....	—	5	5	5	5
Sikorsky S-76 .....	25	72	75	75	124

(Continued on next page)

**TURBINE-ENGINEED AIRCRAFT IN THE WORLD AIRLINE FLEET**

(By Model, 1994-1998, continued)

	1994	1995 <sup>a</sup>	1996 <sup>a</sup>	1997 <sup>a</sup>	1998 <sup>a</sup>
<b>Turboprops—TOTAL</b> .....	<b>6,052</b>	<b>6,457</b>	<b>6,851</b>	<b>7,072</b>	<b>7,010</b>
Aerospatale N.262/Mohawk 298	12	13	9	9	11
Aerospatale/Aeritalia ATR 42 ...	245	259	283	296	299
Aerospatale/Aeritalia ATR 72 ...	138	158	177	177	202
Airtech CN-235 .....	24	25	24	24	24
Antonov An-8 .....	—	—	—	2	—
Antonov An-12 .....	23	46	68	71	83
Antonov An-22 .....	2	2	5	3	3
Antonov An-24/26/28/30/32 .....	307	400	484	530	499
B.Ae. ATP .....	53	52	55	50	57
B.Ae. Vanguard .....	2	1	—	—	—
B.Ae. Viscount.....	25	24	20	18	12
B.Ae. (HP-137) Jetstream 31 .....	306	296	274	287	233
B.Ae. Jetstream 41 .....	30	66	74	91	92
B.Ae. HS-748 .....	122	126	126	125	124
Beech 18 Turbo .....	21	21	20	20	18
Beech 90 King Air .....	30	35	39	46	39
Beech 99 .....	140	143	140	138	139
Beech 100 King Air .....	44	46	48	39	39
Beech 200/300 Super King Air ...	101	121	126	122	111
Beech 1300 .....	5	5	5	9	6
Beech 1900C/D .....	291	371	389	430	467
Bristol 175 Britannia .....	3	1	1	—	—
Canadair CL-44 .....	4	2	1	—	—
CASA/Nurtanio C-212 Aviocar ...	107	114	111	113	105
Cessna 208 Caravan I .....	380	458	528	608	601
Cessna F406 Caravan II .....	21	35	28	30	31
Cessna 425/441 Conquest I/II ...	7	4	5	14	19
Convair 580/600/640 .....	110	111	114	107	107
DHC-2/3 Turbo Beaver/Otter ...	9	17	22	20	20
DHC-5 Buffalo .....	1	1	1	1	1
DHC-6 Twin Otter .....	405	395	394	395	371
DHC-7 Dash 7 .....	73	70	75	69	71
DHC-8 Dash 8 .....	358	365	408	424	444
Dornier DO-228 .....	126	106	112	114	118
Dornier DO-328 .....	15	42	59	61	73
Douglas DC-3T Turbo Express ...	2	2	1	1	1
Embraer EMB-110 Bandeirante ...	188	192	211	200	199
Embraer EMB-120 Brasilia .....	276	254	295	308	316
Embraer EMB-121 Xingu .....	—	—	—	2	2
Fokker/Fairchild F-27/FH-227					
Friendship .....	348	315	312	318	278
Fokker 50 .....	164	171	176	171	167
GAF Nomad .....	22	18	13	15	15
Grumman G-21 Turbo Goose ...	1	1	—	—	—
Grumman G-73 Turbo Mallard	5	5	5	5	5
Grumman G-159 Gulfstream I ...	41	39	34	30	27

(Continued on next page)

## TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

(By Model, 1994–1998, continued)

	1994	1995 <sup>a</sup>	1996 <sup>a</sup>	1997 <sup>a</sup>	1998 <sup>a</sup>
<b>Turboprops (continued)</b>					
Handley Page Herald .....	16	15	10	2	1
Harbin YU-12 II .....	40	41	42	42	48
IAI Arava .....	2	2	2	3	3
Ilyushin IL-18 .....	33	33	38	34	32
Ilyushin IL-114 .....	—	2	2	2	2
LET L-410 .....	25	61	87	115	118
Lockheed L-188 Electra .....	65	51	53	36	44
Lockheed L-100/L-382 Hercules	14	56	56	45	35
Mitsubishi MU-2B .....	7	14	15	15	16
Nihon AMC YS-11 .....	85	81	78	63	49
Pilatus Britten-Norman BN-2T Turbo Islander .....	2	2	5	6	6
Pilatus PC-6 Turbo Porter .....	—	25	28	30	24
Pilatus PC-XII .....	—	—	2	2	14
Piper PA-31T/42 Cheyenne ...	17	16	18	20	20
Piper T-1040 .....	10	12	13	14	13
PZL (Antonov) An-28 .....	1	6	6	3	3
Rockwell Turbo Commander	9	9	9	11	9
Saab SF-340A/B .....	347	355	379	396	432
Saab 2000 .....	5	22	34	42	45
Shorts SC-5 Belfast .....	2	2	2	2	2
Shorts SC-7 Skyliner/Skyvan ...	31	35	35	32	30
Shorts 330 .....	62	50	52	48	42
Shorts 360 .....	108	106	104	103	93
Swearingen Merlin .....	49	38	45	53	55
Swearingen Metro .....	396	423	398	394	379
Transall C-160 .....	6	6	—	—	—
Xian (Antonov) Y-7 .....	65	66	66	66	66
<b>TOTAL AIRCRAFT IN SERVICE</b>	<b>18,347</b>	<b>20,041</b>	<b>21,127</b>	<b>22,110</b>	<b>23,002</b>
Number Manufactured in U.S.	10,913	11,775	12,117	12,487	13,139
Percent Manufactured in U.S.	59.5%	58.8%	57.4%	56.5%	57.1%
<b>Turbojet Aircraft in Service .....</b>	<b>12,000</b>	<b>12,810</b>	<b>13,425</b>	<b>14,024</b>	<b>14,621</b>
Number Manufactured in U.S.	8,949	9,265	9,520	9,789	10,126
Percent Manufactured in U.S.	74.6%	72.3%	70.9%	69.8%	69.3%
<b>Turboprop Aircraft in Service ...</b>	<b>6,052</b>	<b>6,457</b>	<b>6,851</b>	<b>7,072</b>	<b>7,010</b>
Number Manufactured in U.S.	1,793	2,002	2,074	2,172	2,165
Percent Manufactured in U.S.	29.6%	31.0%	30.3%	30.7%	30.9%
<b>Turbine-Powered Helicopters In Service .....</b>	<b>295</b>	<b>774</b>	<b>851</b>	<b>1,014</b>	<b>1,371</b>
Number Manufactured in U.S.	171	508	523	526	848
Percent Manufactured in U.S.	58.0%	65.6%	61.5%	51.9%	61.9%

Source: Exxon International Company, "Air World Survey," compiled by Aviation Data Service, Inc. (Annually).

NOTE: The "Air World Survey" covers aircraft in airline service as of December 31. Excludes air taxi operators.

a Includes aircraft operated in the Commonwealth of Independent State countries. Formerly grouped under Aeroflot and excluded from the summary.

b RJ-70 combined with B.Ae. 146.



**PERCENT OF CIVIL TURBOJET ENGINE MARKET  
BY MANUFACTURER AND AIRCRAFT MODEL**  
as of December 1998

Aircraft Manufacturer and Model	Total Installed Engines	Engine Manufacturers					
		P&W	GE	RR	CFM	IAE	Other
<b>TOTAL ENGINES</b> .....	37,119	15,218	5,164	3,799	6,218	866	5,854
<b>PERCENT SHARE</b> .....	100.0%	41.0%	13.9%	10.2%	16.8%	2.3%	15.8%
Airbus A300 <sup>a</sup> .....	500	16%	84%	—%	—%	—%	—%
Airbus A300B4-600R ...	318	53	47	—	—	—	—
Airbus A310 <sup>a</sup> .....	152	34	66	—	—	—	—
Airbus A310-300 .....	298	42	58	—	—	—	—
Airbus A319 .....	234	—	—	—	80	20	—
Airbus A320 <sup>a</sup> .....	36	—	—	—	100	—	—
Airbus A320-200 .....	1,302	—	—	—	61	39	—
Airbus A321 .....	220	—	—	—	50	50	—
Airbus A330 .....	174	52	21	28	—	—	—
Airbus A340 .....	596	—	—	—	100	—	—
Antonov AN-72 .....	6	—	—	—	—	—	100
Antonov AN-74 .....	10	—	—	—	—	—	100
Antonov AN-124 .....	68	—	—	—	—	—	100
AS Corvette .....	6	100	—	—	—	—	—
AS Caravelle .....	28	71	—	29	—	—	—
AS/B Ae Concorde .....	52	—	—	100	—	—	—
Avro Int'l RJ .....	468	—	—	—	—	—	100
BAe 1-11 .....	230	—	—	100	—	—	—
BAe 146 .....	820	—	—	—	—	—	100
BAe HS 125 .....	44	5	—	32	—	—	64
Beech 400 Beechjet .....	6	100	—	—	—	—	—
Boeing B-707 <sup>a</sup> .....	104	100	—	—	—	—	—
Boeing B-707-320C .....	424	100	—	—	—	—	—
Boeing B-720 .....	8	100	—	—	—	—	—
Boeing B-727 series <sup>a</sup> .....	1,440	89	—	11	—	—	—
Boeing B-727 Adv F .....	510	100	—	—	—	—	—
Boeing B-727-200 ADV .....	2,076	100	—	—	—	—	—
Boeing B-737 <sup>a</sup> .....	590	35	—	—	65	—	—
Boeing B-737-200 .....	232	100	—	—	—	—	—
Boeing B-737-200 ADV .....	1,372	100	—	—	—	—	—
Boeing B-737-300 .....	2,066	—	—	—	100	—	—
Boeing B-737-400 .....	916	—	—	—	100	—	—
Boeing B-737-500 .....	760	—	—	—	100	—	—
Boeing B-747 <sup>a</sup> .....	1,672	43	47	10	—	—	—
Boeing B-747-100 .....	412	93	—	7	—	—	—
Boeing B-747-200B .....	696	73	11	16	—	—	—
Boeing B-747-400 .....	1,448	41	32	27	—	—	—
Boeing B-757 <sup>a</sup> .....	252	31	—	69	—	—	—
Boeing B-757-200 .....	1,376	45	—	55	—	—	—
Boeing B-767 <sup>a</sup> .....	424	22	78	—	—	—	—
Boeing B-767-200ER .....	264	52	48	—	—	—	—
Boeing B-767-300ER .....	740	39	52	8	—	—	—
Boeing B-777 .....	352	39	34	27	—	—	—
Canadair Regional Jet ...	538	—	100	—	—	—	—

(Continued on next page)

**PERCENT OF CIVIL TURBOJET ENGINE MARKET  
BY MANUFACTURER AND AIRCRAFT MODEL (continued)**

Aircraft Manufacturer and Model	Total Installed Engines	Engine Manufacturers					
		P&W	GE	RR	CFM	IAE	Other
Canadair CL 600/601 ...	6	—%	67%	—%	—%	—%	33%
Cessna 500s .....	74	97	—	3	—	—	—
Cessna 650 .....	18	—	—	—	—	—	100
Dassault Falcon .....	140	—	84	—	—	—	16
Embraer EMB-145 .....	178	—	—	—	—	—	100
Fokker F-28 <sup>a</sup> .....	134	—	—	100	—	—	—
Fokker F-28-4000 .....	200	—	—	100	—	—	—
Fokker 70 .....	84	—	—	100	—	—	—
Fokker 100 .....	538	—	—	100	—	—	—
Gulfstream II/III/IV .....	30	—	—	100	—	—	—
IAI 1124/1125 .....	20	—	—	—	—	—	100
Ilyushin IL-62 .....	352	—	—	—	—	—	100
Ilyushin IL-76 .....	816	—	—	—	—	—	100
Ilyushin IL-86 .....	296	—	—	—	—	—	100
Ilyushin IL-96 .....	28	—	—	—	—	—	100
Learjet 23/24/25 .....	48	—	100	—	—	—	—
Learjet 35/36/55/60 .....	82	5	—	—	—	—	95
Lockheed JetStar .....	8	—	—	—	—	—	100
Lockheed L-1011 .....	534	—	—	100	—	—	—
MBB Hansa Jet .....	34	—	100	—	—	—	—
Douglas DC-8 .....	1,016	63	—	—	37	—	—
Douglas DC-9 <sup>a</sup> .....	554	100	—	—	—	—	—
Douglas DC-9-30 .....	962	100	—	—	—	—	—
Douglas DC-10 <sup>a</sup> .....	645	19	81	—	—	—	—
Douglas DC-10-30 .....	399	—	100	—	—	—	—
MDC MD-11 series <sup>a</sup> .....	177	20	80	—	—	—	—
MDC MD-11 <sup>b</sup> .....	372	50	50	—	—	—	—
MDC MD-80s <sup>a</sup> .....	324	100	—	—	—	—	—
MDC MD-82 .....	1,178	100	—	—	—	—	—
MDC MD-83 .....	482	100	—	—	—	—	—
MDC MD-88 .....	316	100	—	—	—	—	—
MDC MD-90 .....	196	—	—	—	—	100	—
Rockwell Sabreliner .....	2	—	100	—	—	—	—
Tupolev TU-134 .....	378	—	—	—	—	—	100
Tupolev TU-154 <sup>a</sup> .....	225	—	—	—	—	—	100
Tupolev TU-154B2 .....	519	—	—	—	—	—	100
Tupolev TU-154M .....	564	—	—	—	—	—	100
Tupolev TU-204 .....	14	—	—	—	—	—	100
Yakovlev YAK-40 .....	669	—	—	—	—	—	100
Yakovlev YAK-42 .....	267	—	—	—	—	—	100

Source: Aerospace Industries Association, based on data from Aviation Data Service.

a Data for major (100 or more aircraft) series excluded and reported separately.

b Series bearing same designation as model number, but qualifies for separate reporting as a major series.

KEY: AS = Aerospatiale; BAe = British Aerospace; CFM = CFM International; GE = General Electric;  
IAE = International Aero Engines; IAI = Israel Aircraft Industries; MBB = Messerschmitt Bolkow Blohm;  
MDC = McDonnell Douglas; P&W = Pratt & Whitney; RR = Rolls-Royce.

**ACTIVE<sup>a</sup> U.S. AIR CARRIER FLEET**  
**By Type of Aircraft, Number of Engines and Model**  
**Active as of December 1994–1998**

	1994	1995	1996	1997	1998
<b>TOTAL</b> .....	7,370	7,411	7,478	7,616	8,111
<b>Turbojets—TOTAL</b> .....	4,634	4,832	4,922	5,108	5,412
<b>Four-Engine—TOTAL</b> .....	420	435	440	450	447
Boeing 707 .....	16	6	5	3	—
Boeing 747 .....	186	189	195	201	201
B.Ae./AVRO 146.....	15	21	21	26	18
McDonnell Douglas DC-8.....	203	219	219	220	228
<b>Three-Engine—TOTAL</b> .....	1,236	1,210	1,212	1,224	1,238
Boeing 727 .....	906	877	856	874	882
Lockheed L-1011 .....	86	97	102	79	70
McDonnell Douglas DC-10/MD-11 ...	244	236	254	271	286
<b>Twin-Engine—TOTAL</b> .....	2,978	3,187	3,270	3,434	3,727
Airbus A-300 .....	63	53	62	68	61
Airbus A-310 .....	17	23	27	28	39
Airbus A-319 .....	—	—	—	2	23
Airbus A-320 .....	86	104	113	119	143
Beech 400 .....	—	—	—	—	1
Boeing 737 .....	1,012	1,055	1,055	1,077	1,080
Boeing 757 .....	395	440	457	487	510
Boeing 767 .....	194	210	213	234	261
Boeing 777 .....	—	7	15	23	36
Canadair CL-600.....	—	35	53	77	152
Cessna C500/C501 .....	—	—	—	—	10
Dassau AMD .....	—	—	—	—	27
Embraer EMB-145 .....	—	—	—	11	55
Fokker F-28 .....	148	155	155	142	147
Israel Aircraft 1124.....	—	—	—	—	1
Learjet LR-25 .....	—	—	2	3	7
Learjet LR-31 .....	—	—	—	—	1
Learjet LR-35 .....	2	3	4	9	11
McDonnell Douglas DC-9/ MD-80/MD-90 .....	1,061	1,102	1,114	1,154	1,158
Mitsubishi MU-300.....	—	—	—	—	2
North American NA-265 .....	—	—	—	—	1
Swearingen SA-26 .....	—	—	—	—	1
<b>Turboprops—TOTAL</b> .....	1,782	1,715	1,704	1,654	1,851
<b>Four-Engine—TOTAL</b> .....	87	81	56	45	39
Canadair CL44D .....	1	1	—	—	—
De Havilland DHC-7 .....	27	16	12	5	7
Lockheed 188 Electra.....	41	43	23	22	17
Lockheed 382 .....	18	21	21	18	15
<b>Twin-Engine—TOTAL</b> .....	1,695	1,634	1,643	1,604	1,808
Beech BE65 .....	—	—	4	4	15
Beech BE90 .....	1	1	3	2	8

(Continued on next page)

**ACTIVE<sup>a</sup> U.S. AIR CARRIER FLEET (Continued)**

By Type of Aircraft, Number of Engines, and Model  
Active as of December 1994–1998

	1994	1995	1996	1997	1998
<b>Twin-Engine (continued)</b>					
Beech BE95 .....	1	—	—	—	1
Beech BE99 .....	41	36	27	28	36
Beech BE100 .....	1	1	2	1	2
Beech BE200 .....	7	4	11	7	19
Beech BE1900 .....	281	289	254	243	325
B.Ae. ATP .....	9	10	10	9	—
B.Ae. Jetstream .....	237	174	223	215	203
CASA C212 Aviocar .....	1	1	—	—	3
Cessna CE208B .....	—	—	—	—	137
Cessna C441 .....	2	2	2	2	4
Convair 580/600/640 .....	29	34	23	19	15
DeHavilland DHC-6 .....	53	44	38	49	54
DeHavilland DHC-8 .....	142	137	151	154	169
Dornier DO228 .....	7	—	—	—	—
Dornier DO328 .....	—	33	39	47	35
Embraer EMB110 .....	15	14	3	1	1
Embraer EMB120 .....	223	217	235	227	218
Fairchild/Fokker F-27/FH-227 .....	37	35	36	44	38
Grumman G-73 .....	5	5	5	5	5
Gulfstream 690A .....	—	—	—	1	—
McKinnon G-21 .....	2	2	4	4	4
Mitsubishi MU-2 .....	—	—	3	11	13
Nihon YS-11 .....	25	11	11	—	—
Piper PA31T .....	1	5	9	10	6
Piper 42 .....	—	1	2	2	2
Saab-Fairchild SF340 .....	202	219	226	253	271
Shorts SC-7 .....	5	3	3	3	3
Shorts SD-3 .....	63	38	39	33	15
SNAIS ATR-42 .....	111	110	99	95	83
SNAIS ATR-72 .....	44	51	51	55	60
Swearingen SA-226 .....	11	13	9	7	3
Swearingen SA-227 .....	138	144	121	73	60
<b>Single-Engine—TOTAL</b> .....	—	—	5	5	4
<b>Piston-Engine—TOTAL</b> .....	826	746	731	720	731
<b>Four-Engine—TOTAL</b> .....	19	15	18	19	17
Douglas DC-6 .....	18	15	18	19	17
Douglas DC-7 .....	1	—	—	—	—
<b>Three-Engine—TOTAL</b> .....	5	1	7	4	3
Pilatus Britten-Norman BN2A-MK-3 Turbo Islander .....	5	1	7	4	3
<b>Twin-Engine—TOTAL</b> .....	337	331	309	290	371
<b>Single-Engine—TOTAL</b> .....	465	399	397	407	340
<b>Helicopters—TOTAL</b> .....	128	118	121	134	117

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

NOTE: Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), multi-engine aircraft in passenger service of commuters, and all aircraft over 12,500 pounds operated by Part 121 and Part 135 commuter operators.

a "Active aircraft" equals the average number of aircraft reported in operation during the last quarter of the year.

**JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS<sup>a</sup>**  
**Calendar Years 1978–1998**

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1982 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1978	10,359.5	\$ 4,069.6	39.3 c	39.0	19.4%
1979	11,042.0	6,354.0	57.5	57.1	24.3
1980	10,854.0	9,818.3	90.5	89.7	30.0
1981	10,326.9	10,827.5	104.8	104.0	29.9
1982	9,942.5	10,024.6	100.8	100.0	27.5
1983	10,472.5	9,320.9	89.0	88.3	24.7
1984	11,424.0	9,740.2	85.3	84.6	24.0
1985	12,072.6	9,689.8	80.3	79.6	22.3
1986	13,006.9	7,275.8	55.9	55.5	15.5
1987	14,139.6	7,895.6	55.8	55.4	15.0
1988	14,871.4	7,943.5	53.4	53.0	13.5
1989	15,115.8	9,104.3	60.2	59.7	13.9
1990	15,945.9	12,405.9	77.8	77.2	17.3 <sup>r</sup>
1991	14,682.9	10,275.2	70.0	69.4	14.5 <sup>r</sup>
1992	15,413.1	10,095.5 <sup>r</sup>	65.5	65.0	13.5 <sup>r</sup>
1993	15,569.3	9,378.7	60.2	59.7	12.4 <sup>r</sup>
1994	16,041.3	8,798.5	54.8	54.4	10.7
1995	16,233.1	9,053.2	55.8	55.3	11.5 <sup>r</sup>
1996	16,848.4 <sup>r</sup>	10,979.4	65.2	64.6	13.0 <sup>r</sup>
1997 <sup>r</sup>	17,450.8	10,990.1	63.0	62.5	12.5
1998	17,921.8	8,954.6	50.0	49.6	9.9

Source: Air Transport Association of America, "Airline Cost Index" (Quarterly).

a Majors and Nationals.

r Revised.

**U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES<sup>a</sup>**  
**BY TYPE AND STATE**  
**As of December 31, 1998**

State	TOTAL <sup>a</sup>	Public <sup>b</sup>	Paved	Lighted	State	TOTAL <sup>a</sup>	Public <sup>b</sup>	Paved	Lighted
Alabama.....	240	98	155	99	Nevada .....	118	53	60	34
Alaska.....	559	404	67	161	New Hampshire .....	98	27	52	20
Arizona .....	283	75	169	76	New Jersey .....	366	54	158	50
Arkansas.....	279	100	181	101	New Mexico.....	167	65	81	52
California .....	927	268	675	250	New York .....	534	168	220	136
Colorado .....	400	79	175	84	North Carolina ...	369	115	160	118
Connecticut ...	144	24	93	26	North Dakota ...	437	92	88	96
Delaware .....	38	11	15	12	Ohio .....	749	179	295	179
Dist. of Col. ...	17	3	17	4	Oklahoma .....	429	151	219	132
Florida .....	789	128	342	149	Oregon .....	422	100	167	75
Georgia .....	403	110	193	115	Pennsylvania.....	783	144	331	135
Hawaii .....	46	13	38	14	Rhode Island.....	26	8	19	7
Idaho .....	227	121	80	48	South Carolina ...	167	67	78	67
Illinois.....	902	124	298	156	South Dakota ...	174	74	75	73
Indiana .....	610	116	172	118	Tennessee .....	261	83	149	84
Iowa .....	305	123	178	131	Texas .....	1,744	385	852	421
Kansas .....	398	145	143	128	Utah .....	129	47	87	45
Kentucky .....	175	63	106	58	Vermont.....	79	17	18	11
Louisiana .....	457	84	259	76	Virginia .....	383	66	163	85
Maine.....	152	64	51	33	Washington .....	461	135	230	136
Maryland .....	212	35	83	46	West Virginia ...	112	40	69	33
Massachusetts	219	46	119	41	Wisconsin .....	512	135	188	142
Michigan .....	485	235	200	184	Wyoming .....	106	41	54	37
Minnesota .....	490	158	157	141	<b>50 States—Total</b>	<b>18,691</b>	<b>5,311</b>	<b>8,369</b>	<b>4,821</b>
Mississippi .....	227	83	127	82	Puerto Rico .....	34	11	30	10
Missouri .....	525	140	237	141	Virgin Islands ...	9	2	3	2
Montana.....	253	122	109	88	S. Pacific <sup>c</sup> .....	36	28	19	12
Nebraska .....	303	93	117	91	<b>TOTAL</b> .....	<b>18,770</b>	<b>5,352</b>	<b>8,421</b>	<b>4,845</b>

**FACILITIES BY CLASS**

Class	Total <sup>a</sup>	Public <sup>b</sup>	Private
Airports .....	13,413	5,072	8,341
Heliports .....	4,823	81	4,742
Stolports .....	88	4	84
Seaplane Bases .....	446	195	251
<b>Total Facilities</b> .....	<b>18,770</b>	<b>5,352</b>	<b>13,418</b>

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

a Included in these data are facilities having joint civil-military use.

b "Public" refers to use, whether publicly or privately owned.

c American Samoa, Guam, and Trust Territories.

**HELIPORTS/HELIPADS<sup>a</sup> IN THE UNITED STATES  
BY STATE  
As of 1998**

State	Total Helipads in State	Private Use		Public Use	
		Heliports & Helistops	Helipads at Airports	Heliports & Helistops	Helipads at Airports
Alabama .....	70	69	—	—	1
Alaska .....	27	17	1	6	3
Arizona .....	97	91	1	—	5
Arkansas .....	79	76	1	—	2
California.....	402	380	3	—	19
Colorado .....	156	151	—	—	5
Connecticut.....	79	74	—	2	3
Delaware.....	12	10	—	1	1
District of Columbia ...	19	18	—	1	—
Florida .....	253	250	1	1	1
Georgia .....	100	98	—	—	2
Hawaii .....	18	16	—	—	2
Idaho .....	35	33	1	—	1
Illinois .....	232	220	3	9	—
Indiana .....	113	107	3	2	1
Iowa .....	84	82	—	1	1
Kansas .....	33	29	—	—	4
Kentucky .....	46	46	—	—	—
Louisiana.....	220	214	2	3	1
Maine .....	16	15	—	—	1
Maryland.....	55	53	1	—	1
Massachusetts.....	131	127	—	2	2
Michigan.....	80	77	1	2	—
Minnesota .....	40	38	—	—	2
Mississippi .....	46	46	—	—	—
Missouri .....	119	115	1	3	—
Montana .....	25	20	1	3	1
Nebraska .....	30	28	1	—	1
Nevada .....	26	25	—	—	1
New Hampshire.....	43	41	—	—	2

(Continued on next page)

**HELIPORTS/HELIPADS<sup>a</sup> IN THE UNITED STATES  
BY STATE (Continued)  
As of 1998**

State	Total Helipads in State	Private Use		Public Use	
		Heliports & Helistops	Helipads at Airports	Heliports & Helistops	Helipads at Airports
New Jersey .....	236	230	—	3	3
New Mexico .....	22	20	1	1	—
New York .....	146	131	—	8	7
North Carolina .....	62	59	—	3	—
North Dakota .....	14	13	—	—	1
Ohio .....	205	186	1	15	3
Oklahoma .....	92	86	—	5	1
Oregon .....	94	90	2	2	—
Pennsylvania .....	293	283	1	6	3
Rhode Island .....	16	15	—	1	—
South Carolina .....	25	23	—	—	2
South Dakota .....	13	13	—	—	—
Tennessee .....	90	86	2	1	1
Texas .....	420	404	3	6	7
Utah .....	40	38	—	—	2
Vermont .....	17	17	—	—	—
Virginia .....	116	112	—	—	4
Washington.....	117	109	3	1	4
West Virginia .....	31	28	—	—	3
Wisconsin .....	69	68	—	—	1
Wyoming .....	19	17	—	—	2
<b>Total U.S.</b> .....	<b>4,823</b>	<b>4,594</b>	<b>34</b>	<b>88</b>	<b>107</b>

Source: Helicopter Association International, "1999 Helicopter Annual" (Annually).

NOTE: 96.0 percent of all U.S. helicopter landing areas are private, while 4.0 percent are public.

a Excludes temporary heliports, offshore heliports, and infrequently used helicopter landing sites.



**ACTIVE U.S. CIVIL AIRCRAFT<sup>a</sup>**

As of December 31, 1964–1997

(in thousands)

Year	TOTAL	Air Carrier <sup>b</sup>	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotorcraft <sup>c</sup>	Other <sup>d</sup>
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1964	90.8	2.057	88.7	10.6	45.8	30.4	1.3	0.6
1965	97.6	2.125	95.4	12.0	49.8	31.4	1.5	0.8
1966	107.0	2.272	104.7	13.5	53.0	35.7	1.6	0.9
1967	116.6	2.452	114.2	14.7	56.9	39.7	1.9	1.1
1968	126.8	2.586	124.2	16.8	61.0	42.8	2.4	1.3
1969	133.5	2.690	130.8	18.1	63.7	45.0	2.6	1.4
1970	134.4	2.679	131.7	18.3	64.8	44.9	2.3	1.6
1971	133.8	2.642	131.1	17.9	64.5	44.8	2.4	1.7
1972	147.6	2.583	145.0	19.8	71.0	49.4	2.8	1.9
1973	156.1	2.599	153.5	21.9	74.8	51.4	3.1	2.3
1974	164.0	2.472	161.5	23.4	78.9	53.0	3.6	2.5
1975	171.0	2.495	168.5	24.6	82.6	54.4	4.1	2.8
1976	180.8	2.492	178.3	25.7	88.2	56.7	4.5	3.2
1977	186.8	2.473	184.3	26.7	92.0	57.3	4.7	3.6
1978	201.3	2.545	198.8	28.8	101.5	59.2	5.3	4.0
1979	213.9	3.609	210.3	31.3	106.0	62.4	5.9	4.8
1980	214.9	3.808	211.0	31.7	107.9	60.5	6.0	4.9
1981	217.2	3.973	213.2	33.3	108.0	59.9	7.0	5.0
1982	213.9	4.027	209.8	34.2	106.5	57.7	6.2	6.2
1983	217.5	4.203	213.3	34.6	107.1	59.1	6.5	5.9
1984	225.3	4.370	220.9	35.6	109.9	62.0	7.1	6.3
1985	201.2	4.678	196.5	31.3	98.5	54.9	6.0	5.8
1986	210.2	4.909	205.3	32.0	102.0	58.3	6.5	6.5
1987	208.0	5.253	202.7	30.8	100.4	59.3	5.9	6.3
1988	201.9	5.660	196.2	30.1	98.1	55.6	6.0	6.4
1989	210.8	5.778	205.0	31.9	100.5	58.4	7.0	7.2
1990	204.1	6.083	198.0	30.6 <sup>f</sup>	97.6	56.4	6.9	6.6
1991	202.9	6.054	196.9	29.7	97.8	55.1	6.2	8.1
1992	193.0	7.320	185.7	26.8	91.6	53.2	6.0	8.0
1993	184.4	7.297	177.1	22.8	91.6	42.5	4.7	15.5
1994	180.3	7.370	172.9	22.3	87.3	40.5	4.7	18.1
1995 <sup>f</sup>	190.0	7.411	188.1	24.6	93.6	44.1	5.8	19.9
1996 <sup>f</sup>	194.8	7.478	191.1	25.6	93.8	44.3	6.6	20.9
1997	200.0	7.616	192.4	26.2	95.0	45.7	6.8	18.8

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

a "Active aircraft" must have a current U.S. registration and have flown during the calendar year. Prior to 1971, only a current U.S. registration was necessary.

b Effective 1978, includes certificated route air carriers, supplemental air carriers (arters), multi-engine aircraft in commuter passenger service, and all aircraft over 12,500 pounds operated by air taxis, commercial operators, and travel clubs.

c Includes autogiros; excludes air carrier helicopters.

d Includes gliders, dirigibles, balloons, and experimental aircraft.

f Revised.

**ACTIVE U.S. CIVIL AIRCRAFT  
BY PRIMARY USE AND TYPE OF AIRCRAFT**

As of December 31, 1997

Primary Use <sup>a</sup>	TOTAL	Fixed-Wing			Rotor- craft <sup>b</sup>	Other <sup>c</sup>
		Turbojet	Turboprop	Piston		
<b>TOTAL—ALL AIRCRAFT ...</b>	200,030	10,286	7,273	156,776	6,920	18,772
<b>Air Carrier—TOTAL .....</b>	<u>7,616</u>	<u>5,108</u>	<u>1,654</u>	<u>720</u>	<u>134</u>	<u>—</u>
Large .....	5,821	5,096	678	47	—	—
Small .....	1,795	12	976	673	134	—
<b>General Aviation—TOTAL</b>	<u>192,414</u>	<u>5,178</u>	<u>5,619</u>	<u>156,056</u>	<u>6,786</u>	<u>18,772</u>
Executive.....	10,411	4,283	2,423	3,036	473	196
Business .....	27,716	142	494	25,940	390	749
Air Taxi <sup>d</sup> .....	4,777	271	1,221	2,350	782	152
Instructional .....	14,663	16	49	13,363	611	625
Personal .....	115,630	72	425	99,482	899	14,754
Aerial Application .....	4,858	36	399	3,606	759	57
Aerial Observation.....	3,311	—	19	2,682	488	119
Sight Seeing .....	677	—	—	418	38	223
Air Tours .....	171	—	20	91	55	5
External Load .....	186	—	—	6	180	—
Public Use .....	4,130	214	300	1,980	1,595	42
Other Work .....	679	—	8	606	30	36
Other .....	5,250	148	274	2,511	497	1,820

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually) and General Aviation Manufacturers Association, "General Aviation Statistical Databook" (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

b Includes helicopters and autogiros.

c Includes gliders, dirigibles, and balloons.

d Limited to Air taxis under 12,500 pounds. Otherwise, aircraft included in "Air Carrier."

**U.S. GENERAL AVIATION**  
**TYPE OF AIRCRAFT AND HOURS FLOWN**  
 Calendar Years 1993–1997

	1993 <sup>a</sup>	1994	1995 <sup>r</sup>	1996 <sup>r</sup>	1997
<b>Number of Active Aircraft by Type (in thousands)</b>					
<b>All Aircraft—TOTAL</b> .....	<u>177.1</u>	<u>172.9</u>	<u>188.1</u>	<u>191.1</u>	<u>192.4</u>
Fixed-Wing: .....	156.9	150.2	162.3	163.7	166.9
Piston: .....	149.2	142.2	152.8	153.6	156.1
Single-Engine .....	133.5	127.4	137.0	137.4	140.0
Twin-Engine .....	15.6	14.8	15.7	16.1	15.9
Other .....	0.0	0.1	0.0	0.1	0.1
Turboprop: .....	4.1	4.1	5.0	5.7	5.6
Twin-Engine .....	3.4	3.6	4.3	4.9	4.9
Other .....	0.7	0.5	0.7	0.8	0.7
Turbojet: .....	3.7	3.9	4.6	4.4	5.2
Twin-Engine .....	3.4	3.7	4.1	4.1	4.6
Other .....	0.2	0.3	0.5	0.3	0.5
Rotorcraft: .....	4.7	4.7	5.8	6.6	6.8
Piston .....	1.8	1.6	1.9	2.5	2.3
Turbine .....	2.9	3.1	4.0	4.1	4.5
Balloons, Dirigibles, and Gliders...	5.0	5.9	4.7	4.2	4.1
Experimental .....	10.4	12.1	15.2	16.6	14.7

	1993 <sup>a</sup>	1994	1995 <sup>r</sup>	1996 <sup>r</sup>	1997
<b>Hours Flown by Type of Aircraft (in thousands)</b>					
<b>All Aircraft—TOTAL</b> .....	<u>24,455</u>	<u>24,092</u>	<u>26,612</u>	<u>26,909</u>	<u>27,713</u>
Fixed-Wing: Piston .....	19,321	18,823	20,251	20,091	20,743
Turboprop .....	1,192	1,142	1,490	1,768	1,655
Turbojet .....	1,121	1,238	1,455	1,543	1,713
Rotorcraft: Piston .....	391	369	337	591	343
Turbine .....	1,308	1,408	1,624	1,531	1,739
Balloons, Dirigibles, and Gliders...	338	388	261	227	192
Experimental .....	785	724	1,194	1,158	1,327

	1993 <sup>a</sup>	1994	1995 <sup>r</sup>	1996 <sup>r</sup>	1997
<b>Average Hours Flown Annually by Type</b>					
<b>All Aircraft—TOTAL</b> .....	<u>138.1</u>	<u>139.3</u>	<u>141.5</u>	<u>140.8</u>	<u>144.0</u>
Fixed-Wing: Piston .....	129.5	132.4	132.5	130.8	132.9
Turboprop .....	289.5	279.0	298.3	309.3	294.5
Turbojet .....	306.1	316.3	319.1	348.7	330.7
Rotorcraft: Piston .....	211.7	226.6	181.0	235.9	152.2
Turbine .....	454.9	454.1	409.3	376.9	384.3
Balloons, Dirigibles, and Gliders...	67.2	65.8	55.1	53.6	46.8
Experimental .....	75.3	59.6	78.7	69.6	90.4

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually) and the Federal Aviation Administration, Office of Management Systems.

NOTE: Detail may not add to totals because of rounding and/or estimating procedure.

<sup>a</sup> Beginning in 1993, commuters were excluded from the survey.

NA Not available.

<sup>r</sup> Revised.

**U.S. GENERAL AVIATION  
ACTIVE AIRCRAFT AND HOURS FLOWN  
BY PRIMARY USE  
Calendar Years 1993–1997**

Primary Use <sup>a</sup>	1993 <sup>r</sup>	1994 <sup>r</sup>	1995 <sup>r</sup>	1996 <sup>r</sup>	1997
<b>ACTIVE AIRCRAFT AS OF DECEMBER 31 (in thousands)</b>					
<b>TOTAL</b> .....	<u>180.7</u>	<u>176.6</u>	<u>188.1</u>	<u>191.1</u>	<u>192.4</u>
Executive.....	10.4	10.2	10.6	9.9	10.4
Business.....	28.5	26.5	28.3	30.7	27.7
Air Taxi <sup>b</sup> .....	4.0	4.2	3.8	4.1	4.8
Instructional.....	16.0	15.1	14.2	12.7	14.7
Personal.....	104.6	104.1	113.4	113.4	115.6
Aerial Application.....	5.2	4.4	5.0	5.0	4.9
Aerial Observation.....	4.9	5.1	4.7	3.0	3.3
Sight Seeing.....	1.6	1.3	0.8	0.7	0.7
Public Use.....	NA	NA	NA	4.5	4.1
Air Tours.....	NA	NA	0.2	0.1	0.2
External Load.....	0.1	0.1	0.2	0.4	0.2
Other Work.....	1.0	1.2	1.1	1.0	0.7
Other.....	4.3	4.4	5.9	5.6	5.3
<b>HOURS FLOWN (in thousands)</b>					
<b>TOTAL</b> .....	<u>24,455</u>	<u>24,092</u>	<u>26,612</u>	<u>26,909</u>	<u>27,713</u>
Executive.....	2,635	2,486	3,069	2,898	2,878
Business.....	3,350	3,012	3,335	3,259	3,006
Air Taxi <sup>b</sup> .....	1,334	1,545	1,403	1,734	2,008
Instructional.....	4,626	4,382	4,410	4,759	4,956
Personal.....	8,202	8,248	9,659	9,037	9,644
Aerial Application.....	1,283	1,364	1,526	1,713	1,562
Aerial Observation.....	1,627	1,746	1,391	1,057	1,261
Sight Seeing.....	325	309	179	195	127
Air Tours.....	NA	NA	124	100	114
Public Use.....	NA	NA	NA	1,047	1,096
External Load.....	83	135	128	191	112
Other Work.....	180	241	280	265	139
Other.....	603	622	1,107	656	819

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

NOTE: Detail may not add to totals because of rounding and estimating procedures.

a Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

b Air taxis under 12,500 pounds.

NA Not available.

r Revised.



# RESEARCH AND DEVELOPMENT

Federal outlays for R&D rose an estimated \$1.4 billion to \$74.2 billion in FY 1999. Unfortunately for the aerospace industry, R&D spending at both DoD and NASA declined. DoD's R&D outlays fell \$0.7 billion to \$36.9 billion, while NASA's outlays fell \$0.2 billion to \$9.7 billion.

OMB's forecast for FY 2000 projects a slight, overall decline of \$0.6 billion in federal outlays for R&D with continuing declines for NASA and DoD. NASA's R&D spending is projected to fall 4%, or \$0.4 billion, to \$9.3 billion, while DoD faces a projected 6%, or \$2.2 billion, reduction to \$34.7 billion.

R&D funding from all sources rose \$15.4 billion to \$227 billion in 1998, according to NSF's annual survey. Industry funded two-thirds of the total R&D performed in the United States and its contributions rose 11%, or \$14.7 billion, to \$151 billion in 1998. Federal funding fell less than 1% in FY 1998 to \$64.9 billion and represented 29% of total R&D funding. The remaining sources (local government, colleges and universities, and nonprofit institutions) represented less than 5% of total national R&D.

Industry performed three-quarters, or \$170 billion, of the total R&D performed in the United States. Colleges and universities conducted 12% of the nation's R&D and federal government labs accounted for 7.6%. Nonprofit institutions performed \$6.9 billion of R&D—up \$0.4 billion or 6.8%. FFRDCs R&D rose \$0.3 billion, or 5.4%, to \$5.9 billion.

The NSF projects R&D performed in the United States will increase 8.8% to \$247 billion in 1999. Industry is expected to fund \$169 billion of the total and perform \$188 billion of the R&D. Federal government R&D funding is expected to increase \$1 billion to \$65.9 billion. R&D performed at colleges and universities will rise 5.9%, or \$1.6 billion, to \$28.3 billion. College and

university funding of R&D will increase 8.8%, or \$0.5 billion, to \$5.8 billion.

Aerospace industry-performed R&D grew less than 1% in 1997. Federally-funded aerospace R&D grew 1%, or \$0.1 billion, to \$10.6 billion. On the other hand, company-funded R&D declined a slight \$33 million to \$5.7 billion in 1998. When expressed as a percentage of sales, company-funded R&D fell to a seven-year low of 3.9%. Still, the aerospace industry invests a larger percentage of its sales in R&D than the overall average for the manufacturing sector.

In FY 1998, DoD prime contract awards for RDT&E totaled \$20.1 billion, up \$0.2 billion after declining for four consecutive years. RDT&E contract awards for missile and space systems exceeded aircraft RDT&E for the second consecutive year. Missile/space RDT&E rose \$0.4 billion, or 7.4%, to \$5.3 billion in FY 1998. Aircraft RDT&E grew \$0.3 billion, or 6.9%, to \$4.6 billion. Electronics and Communication Equipment RDT&E dropped 18%, or \$0.6 billion, to \$3.0 billion. All other categories combined rose \$0.2 billion, or 3.1%, to \$7.3 billion in FY 1998.

In a geographical breakdown of FY 1998 DoD awards for RDT&E to business firms, the South Atlantic region marked its fifth year at the top with contracts totaling \$5.1 billion. In second place was the Pacific region (\$4.6 billion); followed by the Mountain (\$2.0 billion) and New England (\$1.5 billion) regions.

## TOTAL U.S. FUNDS FOR RESEARCH AND DEVELOPMENT BY SOURCE AND PERFORMER<sup>a</sup>

Calendar Years 1996–1999  
(Millions of Dollars)

Source of Funds	TOTAL, All Perform- ers	Performer				
		Federal Govern- ment	Indus- try	Colleges & Univer- sities	Federally- Funded Research & Devel- opment Centers	Non- Profit Insti- tutions
<b>1996<sup>f</sup></b>						
<b>All Sources—TOTAL</b> .....	<u>\$196,540</u>	<u>\$16,627</u>	<u>\$144,667</u>	<u>\$23,720</u>	<u>\$5,410</u>	<u>\$6,114</u>
Federal Government .....	63,547	16,627	23,653	14,180	5,410	3,677
Gov't, Non-Federal .....	1,839	—	—	1,839	—	—
Industry .....	123,561	—	121,015	1,655	—	891
Colleges & Universities ...	4,375	—	—	4,375	—	—
Nonprofit Institutions.....	3,218	—	—	1,672	—	1,546
<b>1997</b>						
<b>All Sources—TOTAL</b> .....	<u>\$211,586</u>	<u>\$16,814</u>	<u>\$157,539</u>	<u>\$25,136</u>	<u>\$5,612</u>	<u>\$6,485</u>
Federal Government .....	65,016	16,814	23,928	14,805	5,612	3,856
Gov't, Non-Federal .....	1,898	—	—	1,898	—	—
Industry .....	136,394	—	133,611	1,805	—	978
Colleges & Universities ...	4,842	—	—	4,842	—	—
Nonprofit Institutions.....	3,436	—	—	1,785	—	1,651
<b>1998<sup>p</sup></b>						
<b>All Sources—TOTAL</b> .....	<u>\$226,984</u>	<u>\$17,189</u>	<u>\$170,270</u>	<u>\$26,684</u>	<u>\$5,913</u>	<u>\$6,928</u>
Federal Government .....	64,853	17,189	22,228	15,446	5,913	4,077
Gov't, Non-Federal .....	1,974	—	—	1,974	—	—
Industry .....	151,105	—	148,042	1,983	—	1,079
Colleges & Universities ...	5,366	—	—	5,366	—	—
Nonprofit Institutions.....	3,686	—	—	1,915	—	1,771
<b>1999<sup>E</sup></b>						
<b>All Sources—TOTAL</b> .....	<u>\$247,000</u>	<u>\$17,362</u>	<u>\$188,058</u>	<u>\$28,256</u>	<u>\$6,169</u>	<u>\$7,155</u>
Federal Government .....	65,853	17,362	22,103	16,137	6,169	4,082
Gov't, Non-Federal .....	2,085	—	—	2,085	—	—
Industry .....	169,312	—	165,955	2,163	—	1,194
Colleges & Universities ...	5,838	—	—	5,838	—	—
Nonprofit Institutions.....	3,913	—	—	2,032	—	1,880

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).

a Source/performer detail not available by industry.

E Estimate.

p Preliminary.

r Revised.

## FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

By Funding Source  
Calendar Years 1983-1997  
(Millions of Dollars)

Year	All Industries <sup>a</sup>			Aerospace Industry <sup>b</sup>		
	Total	Federal Funds	Company Funds <sup>c</sup>	Total	Federal Funds	Company Funds <sup>c</sup>
<b>CURRENT DOLLARS</b>						
1983	\$ 65,268	\$20,680	\$ 44,588	\$15,406	\$11,396	\$4,010
1984	74,800	23,396	51,404	18,858	14,094	4,764
1985	84,239	27,196	57,043	22,231	16,582	5,649
1986	87,823	27,891	59,932	21,050	14,984	6,066
1987	92,155	30,752	61,403	24,458	18,519	5,939
1988	97,015	30,343	66,672	24,168	18,402	5,766
1989	102,055	28,554	73,501	22,331	16,828	5,503
1990	109,727	28,125	81,602	20,635	15,248	5,387
1991	116,952	26,372	90,580	16,629	11,096	5,533
1992	119,110	24,722	94,388	17,158	10,287	6,871
1993	117,400	22,809	94,591	15,056	9,372	5,684
1994	119,595	22,463	97,131	14,260	8,794	5,466
1995	132,103	23,451	108,652	16,951	11,462	5,489
1996	144,667	23,653	121,015	16,224	10,515	5,710
1997	157,539	23,928	133,611	16,296	10,619	5,677
<b>CONSTANT DOLLARS<sup>dr</sup></b>						
1983	\$ 89,213	\$28,267	\$ 60,946	\$21,058	\$15,577	\$5,481
1984	98,525	30,817	67,708	24,839	18,564	6,275
1985	107,270	34,631	72,638	28,309	21,115	7,193
1986	108,989	34,613	74,376	26,123	18,595	7,528
1987	110,950	37,024	73,926	29,446	22,296	7,150
1988	112,677	35,242	77,436	28,070	21,373	6,697
1989	113,748	31,826	81,923	24,890	18,756	6,134
1990	117,180	30,035	87,144	22,037	16,284	5,753
1991	120,173	27,098	93,074	17,087	11,402	5,685
1992	119,110	24,722	94,388	17,158	10,287	6,871
1993	114,380	22,222	92,158	14,669	9,131	5,538
1994	113,802	21,375	92,426	13,569	8,368	5,201
1995 <sup>r</sup>	122,887	21,815	101,072	15,768	10,662	5,106
1996 <sup>r</sup>	132,116	21,601	110,516	14,816	9,603	5,215
1997	141,164	21,441	119,723	14,602	9,515	5,087

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).

NOTE: Detail may not add to totals because of rounding.

- a Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.
- b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.
- c Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.
- d Based on GDP deflator, 1992=100.
- r Revised.



## FUNDS FOR INDUSTRIAL RESEARCH AND DEVELOPMENT IN THE AEROSPACE INDUSTRY

By Type of Research and Funding Source  
Calendar Years 1964-1997  
(Millions of Dollars)

Year	TOTAL AERO- SPACE	Basic Research			Applied Research			Development		
		Total	Federal Funds	Com- pany Funds	Total	Federal Funds	Com- pany Funds	Total	Federal Funds	Com- pany Funds
1964	\$ 5,078	\$ 67	\$ 34	\$ 28	\$ 766	\$ 607	\$ 159	\$ 4,244	\$ 3,948	\$ 296
1965	5,148	71	41	30	735	563	172	4,342	3,921	421
1966	5,526	69	36	33	773	563	210	4,685	4,162	523
1967	5,669	71	33	38	726	490	236	4,871	4,071	800
1968	5,765	68	26	42	677	426	251	5,021	4,145	876
1969	5,882	65	24	41	597	347	250	5,220	4,216	1,004
1970	5,219	63	20	43	565	352	213	4,591	3,718	873
1971	4,881	54	37	17	461	279	182	4,365	3,583	782
1972	4,950	60	44	16	451	267	184	4,438	3,722	716
1973	5,052	50	21	29	512	308	204	4,491	3,633	858
1974	5,278	51	19	32	609	360	249	4,617	3,735	882
1975	5,713	54	17	37	614	381	233	5,044	4,119	925
1976	6,339	54	21	33	666	365	301	5,619	4,521	1,098
1977	7,033	56	25	31	753	419	334	6,223	5,017	1,206
1979 <sup>a</sup>	8,041	86	44	42	880	499	381	7,076	5,314	1,762
1981 <sup>a</sup>	11,968	131	60	71	1,484	897	587	10,353	7,738	2,615
1983	13,853	146	NA	NA	3,466	NA	NA	10,241	7,668	2,573
1984	16,033	247	NA	NA	3,067	NA	NA	12,718	9,870	2,848
1985	17,619	304	162	142	3,785	2,776	1,009	13,530	10,483	3,047
1986	21,050	311	208	103	3,198	1,571	1,627	17,541	13,205	4,336
1987	24,488	425	335	90	2,949	1,709	1,239	21,115	16,475	4,640
1988	25,900	366	263	104	2,997	1,915	1,082	22,537	17,700	4,838
1989	25,638	668	553	116	3,081	2,113	968	21,889	16,967	4,921
1990	25,356	658	519	139	3,340	1,931	1,409	21,358	16,766	4,592
1991	16,983	364	302	62	2,091	1,105	986	14,528	10,043 <sup>b</sup>	4,485
1992	17,158	270	235	35	1,739	976	763	15,148	9,076	6,072
1993	15,056	NA	NA	NA	1,453	825	628	NA	NA	NA
1994	14,260	NA	NA	NA	NA	NA	NA	12,787	7,978	4,809
1995	16,951	252	250	2	1,987	564	1,423	14,712	10,648	4,064
1996	16,224	NA	NA	108	NA	NA	NA	13,259	9,264	3,995
1997	16,296	NA	NA	10	NA	NA	1,508	13,275	9,115	4,159

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).

NOTE: Detail may not add to totals because of rounding.

<sup>a</sup> Break-outs by Research Type and Funding Source available only for odd-numbered years between 1977 and 1983.

<sup>b</sup> Computed by AIA as difference between total and company funds. Figure withheld by NSF because of imputation of more than 50 percent.

NA Not available.

**RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES  
ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY**  
Calendar Years 1978–1997

Year	All Manufacturing Industries <sup>a</sup>		Aerospace Industry <sup>b</sup>	
	Total Funds	Company Funds	Total Funds	Company Funds
1978	2.9%	2.0%	13.3%	3.2%
1979	2.6	1.9	12.9	3.5
1980	3.0	2.1	13.7	3.8
1981	3.1	2.2	16.0	4.6
1982	3.8	2.6	17.1	5.1
1983	3.9	2.6	15.2	4.1
1984	3.9	2.6	15.4	4.0
1985	4.4	3.0	14.9	3.9
1986	4.7	3.2	13.4	4.0
1987	4.6	3.1	14.7	3.6
1988	4.5	3.1	16.3	3.9
1989	4.3	3.1	13.5	3.3
1990	4.2	3.1	11.8	3.1
1991	4.2	3.2	12.1	4.0
1992	4.2	3.3	11.8	4.7
1993	3.8	3.1	12.5	4.7
1994	3.6	2.9	13.8	5.3
1995	3.6	2.9	12.9	4.2
1996	4.0	3.3	12.9	4.5
1997	3.9	3.3	11.2	3.9

Source: National Science Foundation, "Annual Survey of Industrial Research and Development" (Annually).

a Includes all manufacturing industries known to conduct or finance research and development.

b Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

## FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1986–2000  
(Millions of Dollars)

Year	TOTAL	DoD	NASA	Energy <sup>a</sup>	Other <sup>b</sup>
<b>CURRENT DOLLARS</b>					
1986	\$52,141	\$33,396	\$3,431	\$5,392	\$ 9,922
1987	53,256	34,732	3,250	5,262	10,012
1988	56,100	35,605	3,832	5,332	11,331
1989	60,760	37,819	4,975	5,681	12,285
1990	63,810	38,247	6,325	5,957	13,281
1991	62,183	35,330	7,072	5,892	13,889
1992	64,728	35,504	7,617	6,043	15,564
1993	68,378	37,666	8,088	6,036	16,588
1994	68,453	35,474	7,878	5,904	19,197
1995	68,432	35,356	8,992	6,195	17,889
1996	68,439	36,936	8,083	6,135	17,285
1997	71,073	37,702	9,374	5,819	18,178
1998	72,803	37,558	9,881	5,971	19,393
1999 <sup>E</sup>	74,156	36,875	9,673	6,363	21,245
2000 <sup>E</sup>	73,604	34,723	9,255	6,573	23,053
<b>CONSTANT DOLLARS<sup>c</sup></b>					
1986	\$64,691	\$41,434	\$4,257	\$6,690	\$12,310
1987	64,218	41,881	3,919	6,345	12,073
1988	65,377	41,493	4,466	6,214	13,205
1989	67,934	42,284	5,562	6,352	13,735
1990	68,502	41,060	6,790	6,395	14,258
1991	64,007	36,366	7,279	6,065	14,296
1992	64,728	35,504	7,617	6,043	15,564
1993	66,619	36,697	7,880	5,881	16,161
1994	65,119	33,746	7,494	5,616	18,262
1995 <sup>r</sup>	63,569	32,843	8,353	5,755	16,618
1996 <sup>r</sup>	62,353	33,652	7,364	5,589	15,748
1997 <sup>r</sup>	63,555	33,714	8,382	5,203	16,255
1998	64,331	33,187	8,731	5,276	17,136
1999 <sup>E</sup>	64,686	32,166	8,438	5,550	18,532
2000 <sup>E</sup>	62,947	29,696	7,915	5,621	19,715

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

NOTE: Detail may not add to totals because of rounding.

<sup>a</sup> Includes defense and nondefense-related atomic energy R&D with nondefense energy R&D.

<sup>b</sup> Includes but not limited to NSF, NIH, DoT, & Agriculture.

<sup>c</sup> Based on Fiscal Year GDP deflator, 1992=100.

<sup>E</sup> Estimate. Latest year reflects Administration's budget proposal.

<sup>r</sup> Revised.

## FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Fiscal Years 1982–1998  
(Millions of Dollars)

Year	TOTAL	NASA <sup>a</sup>	DoD <sup>b</sup>	DoT <sup>c</sup>
<b>BUDGET AUTHORITY</b>				
1982	\$ 3,581	\$ 516	\$2,984	\$ 81
1983	3,871	547	3,221	103
1984	4,087	600	3,224	263
1985	4,335	648	3,422	265
1986	6,660	601	4,927	1,132
1987	5,824	698	4,179	946
1988	6,974	723	4,989	1,262
1989	10,656	872	8,240	1,544
1990	10,690	932	7,867	1,891
1991	9,417	968	6,149	2,300
1992	11,110	1,117	7,366	2,627
1993	11,359	1,245	7,582	2,532
1994	10,703	1,546	6,848	2,309
1995	10,718	1,310	7,196	2,212
1996	10,159	1,315	6,792	2,052
1997	9,721	1,252	6,323	2,146
1998 <sup>E</sup>	9,610	1,327	6,184	2,099
<b>OUTLAYS</b>				
1982 <sup>d</sup>	\$ 3,309	\$ 563	\$2,657	\$ 89
1983	3,817	563	2,920	334
1984	4,005	586	2,995	424
1985	4,435	643	3,101	691
1986	6,073	648	4,373	1,052
1987	5,867	622	4,182	1,063
1988	6,340	679	4,448	1,213
1989	8,491	855	6,420	1,216
1990	10,009	889	7,649	1,471
1991	9,501	1,017	6,793	1,691
1992	10,011	1,122	6,790	2,099
1993	11,162	1,212	7,572	2,378
1994	11,137	1,330	7,203	2,604
1995	11,155	1,153	7,132	2,870
1996	10,837	1,187	6,974	2,676
1997	10,430	1,302	6,600	2,528
1998 <sup>E</sup>	10,086	1,339	6,318	2,429

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

a Research and Development, Construction of Facilities, Research and Program Management.

b Research, Development, Test, and Evaluation of aircraft and related equipment.

c Federal Aviation Administration: Research, Engineering, and Development; and Facilities, Engineering, and Development.

d First year outlays data available.

e Estimate.

**DEPARTMENT OF DEFENSE**  
**OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION**  
**Fiscal Years 1972-2000**  
**(Millions of Dollars)**

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1972	\$ 7,881	\$ 3,205	\$2,427	\$1,779	\$ 470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,381	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983	20,554	9,182	5,854	3,658	1,861
1984	23,117	10,353	6,662	3,812	2,289
1985	27,103	11,573	8,054	3,950	3,527
1986	32,283	13,417	9,667	3,984	5,215
1987	33,596	13,347	9,176	4,721	6,352
1988	34,792	14,302	8,828	4,624	7,038
1989	37,002	14,912	9,291	4,966	7,833
1990	37,458	14,443	9,160	5,513	8,342
1991	34,589	13,050	7,586	5,559	8,371
1992	34,632	11,998	7,826	5,978	8,830
1993	36,968	12,338	8,944	6,218	9,467
1994	34,786	12,513	7,990	5,746	8,537
1995	34,710	12,052	9,230	5,081	8,347
1996	36,561	13,056	9,404	4,925	9,175
1997	37,027	14,040	8,220	4,859	9,908
1998	37,420	14,499	7,836	4,881	10,204
1999 <sup>E</sup>	36,758	13,730	8,449	5,264	9,315
2000 <sup>E</sup>	34,523	13,125	8,010	4,545	8,843

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

<sup>E</sup> Estimate. Latest year reflects Administration's budget proposal.

Tr. Qtr. See Glossary.

**DEPARTMENT OF DEFENSE  
APPROPRIATIONS FOR  
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION**

Fiscal Years 1998–2000  
(Millions of Dollars)

	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
<b>TOTAL—APPROPRIATIONS FOR RDT&amp;E</b> .....	\$37,184	\$37,443	\$34,775
<b>BY APPROPRIATION</b>			
Army .....	\$ 5,023	\$ 5,032	\$ 4,426
Navy .....	7,888	8,661	7,984
Air Force .....	14,278	13,701	13,078
Defense Agencies .....	9,714	9,757	8,609
Director of Test & Evaluation, Defense .....	250	259	253
Director of Operational Test & Evaluation.....	30	34	24
<b>RECAP OF BUDGET ACTIVITIES</b>			
Basic Research .....	\$ 1,011	\$ 1,108	\$ 1,113
Applied Research .....	2,910	3,151	2,959
Advanced Technology Development .....	3,790	3,532	3,314
Demonstration and Validation .....	6,556	7,237	5,580
Engineering & Manufacturing Development .....	8,284	7,931	7,538
RDT&E Management Support .....	3,516	2,930	2,406
Operational Systems Development .....	11,115	11,554	11,465
<b>RECAP OF FYDP PROGRAMS</b>			
Strategic Forces .....	\$ 125	\$ 140	\$ 159
General Purpose Forces .....	2,774	2,900	2,974
Intelligence and Communications .....	7,832	7,750	7,569
Mobility Forces .....	112	153	237
Research and Development (FYDP Program 6).....	25,862	25,904	22,922
Central Supply and Maintenance .....	217	328	288
Training Medical and Other.....	1	—	—
Administration and Associated Activities .....	78	41	35
Support of Other Nations .....	31	11	4
Special Operations Forces <sup>6</sup> .....	151	215	188

Source: Department of Defense Budget, "RDT&E Programs (R-1)" (Annually).

NOTE: Detail may not add to totals because of rounding.

E Estimate. Latest year reflects Administration's budget proposal.

**DEPARTMENT OF DEFENSE  
PRIME CONTRACT AWARDS  
FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION**

Fiscal Years 1994–1998  
(Millions of Dollars)

Program Categories	1994	1995	1996	1997	1998
<b>TOTAL—RDT&amp;E</b> .....	<u>\$21,824</u>	<u>\$21,549</u>	<u>\$20,277</u>	<u>\$19,856</u>	<u>\$20,103</u>
Research .....	1,052	1,621	1,603	1,704	1,646
Exploratory Development .....	2,181	2,331	2,297	1,983	2,053
Other Development .....	17,468	17,597 <sup>a</sup>	16,376 <sup>a</sup>	16,168 <sup>a</sup>	16,404 <sup>a</sup>
Management & Support .....	1,123	(a)	(a)	(a)	(a)
<b>Aircraft—TOTAL</b> .....	<u>\$ 5,809</u>	<u>\$ 5,770</u>	<u>\$ 5,419</u>	<u>\$ 4,310</u>	<u>\$ 4,609</u>
Research .....	10	10	129	111	207
Exploratory Development .....	81	119	112	127	106
Other Development .....	5,615	5,641 <sup>a</sup>	5,178 <sup>a</sup>	4,072 <sup>a</sup>	4,297 <sup>a</sup>
Management & Support .....	102	(a)	(a)	(a)	(a)
<b>Missile and Space Systems—TOTAL</b> ...	<u>5,727</u>	<u>5,319</u>	<u>5,023</u>	<u>4,904</u>	<u>5,268</u> <sup>a</sup>
Research .....	114	184	210	270	252
Exploratory Development .....	395	471	493	426	416
Other Development .....	5,160	4,663 <sup>a</sup>	4,320 <sup>a</sup>	4,208 <sup>a</sup>	4,600 <sup>a</sup>
Management & Support .....	58	(a)	(a)	(a)	(a)
<b>Electronics &amp; Communications Equipment—TOTAL</b> .....	<u>3,567</u>	<u>3,495</u>	<u>2,875</u>	<u>3,589</u>	<u>2,955</u>
Research .....	108	196	221	260	170
Exploratory Development .....	340	350	351	319	312
Other Development .....	3,069	2,949 <sup>a</sup>	2,303 <sup>a</sup>	3,011 <sup>a</sup>	2,472 <sup>a</sup>
Management & Support .....	50	(a)	(a)	(a)	(a)
<b>All Other—TOTAL</b> <sup>b</sup> .....	<u>6,721</u>	<u>6,965</u>	<u>6,960</u>	<u>7,053</u>	<u>7,271</u>
Research .....	820	1,231	1,044	1,064	1,017
Exploratory Development .....	1,365	1,390	1,341	1,111	1,219
Other Development .....	3,624	4,344 <sup>a</sup>	4,575 <sup>a</sup>	4,878 <sup>a</sup>	5,035 <sup>a</sup>
Management & Support .....	912	(a)	(a)	(a)	(a)

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).

NOTE: Detail may not add to totals because of rounding.

a "Management & Support" combined with "Other Development" beginning in FY 1995.

b "All Other" includes ships, tank-automotive, weapons, ammunition, services, and other.

**DEPARTMENT OF DEFENSE  
NET VALUE OF PRIME CONTRACT AWARDS OVER \$25,000  
FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION**

By Region and Type of Contractor  
Fiscal Year 1998

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions <sup>a</sup>	Business Firms
<b>TOTAL—Millions of Dollars</b>	\$19,799	\$683	\$1,279	\$17,837
New England .....	\$ 2,091	\$323	\$ 292	\$ 1,476
Middle Atlantic .....	1,290	76	145	1,069
East North Central .....	1,691	36	40	615
West North Central .....	834	13	1	820
South Atlantic .....	5,889	95	709	5,085
East South Central .....	1,078	11	3	1,064
West South Central .....	1,173	24	39	1,110
Mountain.....	2,029	34	4	1,991
Pacific <sup>b</sup> .....	4,724	72	44	4,608
<b>PERCENT OF TOTAL</b> .....	100.0%	100.0%	100.0%	100.0%
New England .....	10.6%	47.2%	22.9%	8.3%
Middle Atlantic .....	6.5	11.1	11.4	6.0
East North Central .....	3.5	5.3	3.1	3.4
West North Central .....	4.2	2.0	0.1	4.6
South Atlantic .....	29.7	13.9	55.5	28.5
East South Central .....	5.4	1.6	0.2	6.0
West South Central .....	5.9	3.5	3.1	6.2
Mountain.....	10.2	4.9	0.3	11.2
Pacific <sup>b</sup> .....	23.9	10.6	3.4	25.8

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Includes contracts with other government agencies.

b Includes Alaska and Hawaii.



## MISSILE PROGRAMS RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

By Agency and Model  
Fiscal Years 1998, 1999, and 2000  
(Millions of Dollars<sup>a</sup>)

Agency and Model	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
<b>AIR FORCE</b>			
AMRAAM <sup>b</sup> .....	\$ 44.7	\$ 40.4	\$ 63.3
JASSM <sup>b</sup> .....	167.2	130.9	168.4
JDAM <sup>b</sup> .....	36.5	23.2	13.2
SFW .....	15.8	7.5	11.8
WCMD .....	17.6	7.3	—
<b>NAVY</b>			
AIM-9X Sidewinder <sup>b</sup> .....	\$ 106.3	\$ 117.2	\$ 81.1
JSOW <sup>b</sup> .....	95.7	62.1	40.9
RAM .....	13.2	4.2	6.5
Standard .....	0.5	1.3	1.2
Tomahawk .....	101.7	165.7	147.2
Trident II .....	35.6	56.4	45.9
<b>ARMY</b>			
AAWS-M <sup>b</sup> .....	\$ 7.9	\$ 5.4	\$ 0.7
ATACMS .....	82.8	45.7	27.5
BAT .....	142.4	82.8	100.5
MLRS .....	33.0	25.2	36.5
SADARM .....	10.5	31.6	19.4
<b>BMD ORGANIZATION</b>			
BMD .....	\$ 3,333.3	\$ 3,099.3	\$ 3,319.5

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually).

NOTE: See Missile Programs Chapter for missile program procurement authorization data.

a Total Obligational Authority.

b Navy and Air Force funding.

E Estimate. Latest year reflects Administration's budget proposal.

NA Not available.

\* Programs in R&D only.

### Missile Program Acronyms:

AAWS-M —Advanced Anti-Tank Weapon System-Medium	AMRAAM —Advanced Medium Range Air-to-Air Missile
ATACMS —Army TACTical Missile System	BAT —Brilliant Anti-Tank submunition
BMD —Ballistic Missile Defense	JASSM —Joint Air-to-Surface Standoff Missile
JDAM —Joint Direct Attack Munition	JSOW —Joint Standoff Weapon
MLRS —Multiple Launch Rocket System	RAM —Rolling Airframe Missile
SADARM —Sense And Destroy ARMor	SFW —Sensor Fused Weapon
WCMD —Wind Corrected Munitions Dispenser	

**MILITARY AIRCRAFT PROGRAMS  
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION**

By Agency and Model  
Fiscal Years 1998, 1999, and 2000  
(Millions of Dollars<sup>a</sup>)

Agency and Model	1998	1999 <sup>E</sup>	2000 <sup>E</sup>
<b>AIR FORCE</b>			
B-2 Spirit .....	\$ 434.9	\$ 131.0	\$ 201.8
C-17 Globemaster III .....	101.8	118.2	170.7
C-130J .....	3.7	—	—
E-8C JSTARS .....	112.7	100.5	130.5
F-15E Eagle .....	120.7	103.9	112.7
F-16 Falcon .....	94.6	139.6	112.5
F-22 Raptor .....	2,010.7	1,571.0	1,222.2
JPATS <sup>b</sup> .....	51.9	44.5	33.8
YAL-1A .....	153.5	257.3	308.6
<b>NAVY</b>			
AV-8B Harrier .....	\$ 10.3	\$ 30.8	\$ 38.6
CH-60 .....	29.7	33.9	34.9
E-2C Hawkeye .....	58.3	46.6	16.1
EA-6B Prowler .....	3.4	65.0	87.3
F/A-18E/F Hornet .....	237.8	206.5	142.6
*JSF <sup>b</sup> .....	913.4	923.3	476.9
SH-60R .....	82.0	226.4	118.7
V-22 Osprey .....	487.6	345.8	182.9
<b>ARMY</b>			
*RAH-66 Comanche .....	\$ 262.6	\$ 364.8	\$ 427.1
TMD Aerostat .....	29.9	14.6	24.9
<b>DEFENSE AIRBORNE RECONNAISSANCE OFFICE</b>			
UAVs .....	\$ 516.5	\$ 665.4	\$ 610.1

Source: Department of Defense Budget, "Program Acquisition Costs by Weapon System" (Annually).

NOTE: See Aircraft Production Chapter for aircraft program procurement authorization data.

a Total Obligational Authority.

b Air Force and Navy funding.

E Estimate. Latest year reflects Administration's budget proposal.

NA Not Available.

\* Programs in R&D only.

# FOREIGN TRADE

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While the nation's merchandise trade deficit widened to a record \$231 billion in 1998, the U.S. aerospace industry posted its own record—a trade surplus approaching \$41 billion.

The industry's exports soared in 1998, up 27% or \$13.7 billion, to a record \$64 billion. Accounting for 9.4% of all U.S. merchandise exports in 1998, aerospace exports rose for the third straight year. The United Kingdom was the largest recipient of U.S. aerospace exports with \$7.6 billion in 1998, up from \$6.5 billion the previous year. Maintaining second place was Japan—climbing from \$5.1 billion to \$6.1 billion. Third place was wrested from Canada, despite its \$0.3 billion increase to \$3.1 billion, by Saudi Arabia—whose purchases nearly doubled from \$2.6 billion in 1997 to \$5.0 billion in 1998.

Both civil and military exports grew to unprecedented levels. Civil products accounted for over 81% of the total value of aerospace exports. The civil export total of \$52 billion compares with \$40 billion the previous year—a notable gain of 30%. Foreign shipment of civil transport aircraft made up 56% of the civil export total. The exportation of civil transport aircraft was \$29 billion, up from \$21 billion. Aircraft engines accounted for another \$3.2 billion, and aircraft and engine parts, including spares, rose \$2.4 billion over last year to \$16.7 billion.





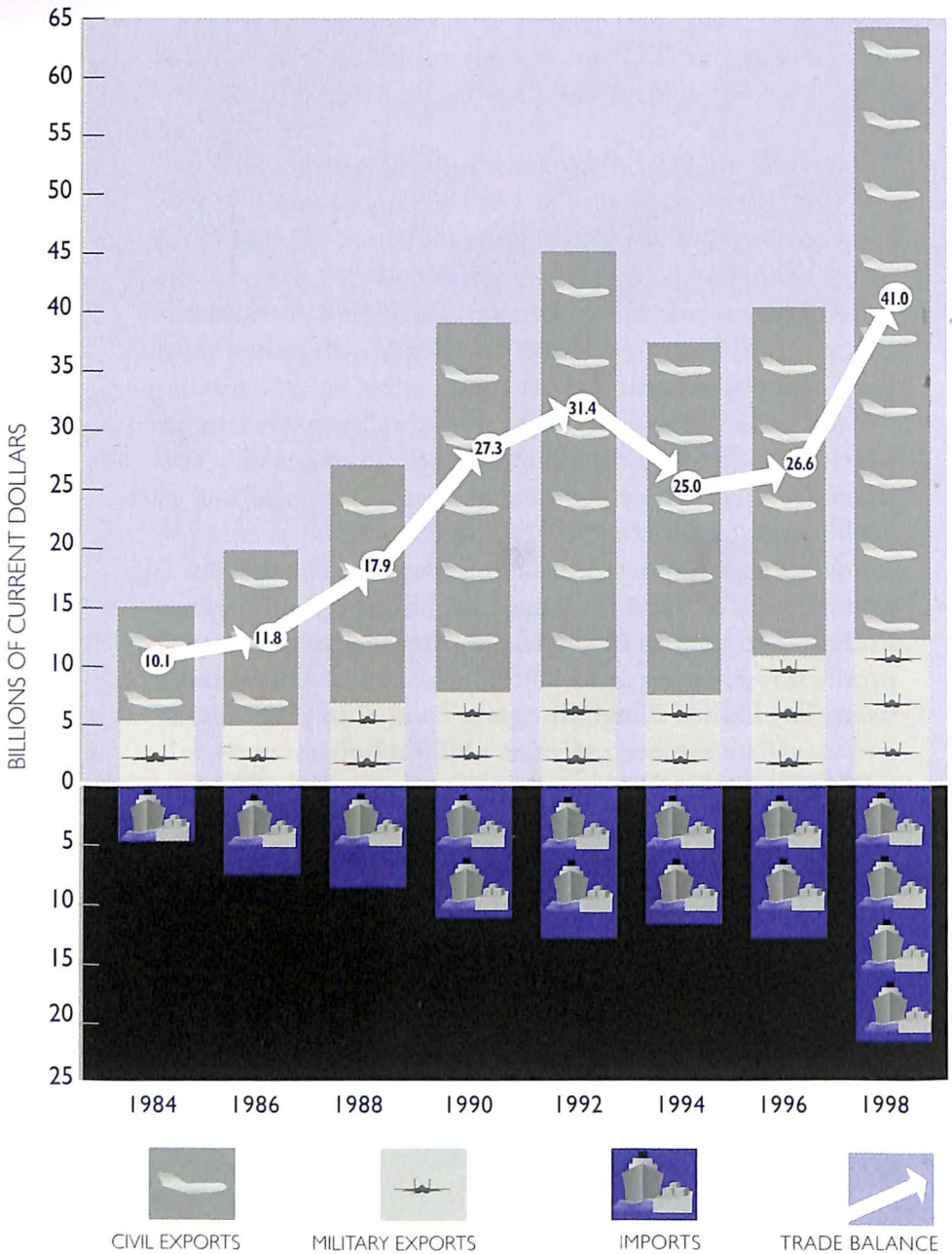
Military aerospace exports increased 17%, or \$1.8 billion, to \$12.1 billion in 1998. The largest component of military exports, parts of aircraft and engines, rose \$0.5 billion to \$6.4 billion. However, military aircraft exports surged nearly 60% to \$3.8 billion, up \$1.4 billion over 1997. On the other hand, exports of guided missiles, rockets, and parts declined \$0.2 billion to \$0.9 billion.

Aerospace imports—doubling over three years—hit an all-time high of \$23.1 billion, up \$5 billion from last year. France continued to be the leading supplier of aerospace products—climbing to \$5.8 billion from \$4.1 billion last year. The United Kingdom was second with \$5.2 billion; and Canada was third, up over a billion dollars, to \$4.9 billion.

At \$16.8 billion, civil imports comprised 73% of the total aerospace imports with complete aircraft rising to \$6.9 billion from \$4.7 billion in the previous year. Aircraft engines imports nudged up to \$2 billion, while imports of aircraft and engine parts jumped slightly more than \$1 billion dollars to \$7.9 billion.

Military imports increased from \$5.2 billion to \$6.3 billion. Military aircraft engines imports grew about \$0.5 billion to \$2 billion, while aircraft and engine parts climbed approximately \$0.6 billion to \$4.2 billion.

# AEROSPACE EXPORTS, IMPORTS, AND TRADE BALANCE



U.S. TOTAL AND AEROSPACE FOREIGN TRADE<sup>a</sup>

Calendar Years 1964–1998

(Millions of Dollars)

Year	Total U.S. Merchandise Trade			Aerospace		
	Trade Balance	Exports	Imports	Trade Balance	Exports	Imports
1964	\$ 7,006	\$ 25,690	\$ 18,684	\$ 1,518	\$ 1,608	\$ 90
1965	5,334	26,699	21,366	1,459	1,618	159
1966	3,837	29,379	25,542	1,370	1,673	303
1967	4,122	30,934	26,812	1,961	2,248	287
1968	837	34,063	33,226	2,661	2,994	333
1969	1,289	37,332	36,043	2,831	3,138	307
1970	3,225	43,176	39,952	3,097	3,405	308
1971	(1,476) <sup>b</sup>	44,087	45,563	3,830	4,203	373
1972	(5,729)	49,854	55,583	3,230	3,795	565
1973	2,390	71,865	69,476	4,360	5,142	782
1974	(3,884)	99,437	103,321	6,350	7,095	745
1975	9,551	108,856	99,305	7,045	7,792	747
1976	(7,820)	116,794	124,614	7,267	7,843	576
1977	(28,353)	123,182	151,534	6,850	7,581	731
1978	(30,205)	145,847	176,052	9,058	10,001	943
1979	(23,922)	186,363	210,285	10,123	11,747	1,624
1980	(19,696)	225,566	245,262	11,952	15,506	3,554
1981	(22,267)	238,715	260,982	13,134	17,634	4,500
1982	(27,510)	216,442	243,952	11,035	15,603	4,568
1983	(52,409)	205,639	258,048	12,619	16,065	3,446
1984	(106,703)	223,976	330,678	10,082	15,008	4,926
1985	(117,712)	218,815	336,526	12,593	18,725	6,132
1986	(138,279)	227,159	365,438	11,826	19,728	7,902
1987	(152,119)	254,122	406,241	14,575	22,480	7,905
1988	(118,526)	322,426	440,952	17,860	26,947	9,087
1989	(109,399)	363,812	473,211	22,083	32,111	10,028
1990	(101,718)	393,592	495,311	27,282	39,083	11,801
1991	(66,723)	421,730	488,453	30,785	43,788	13,003
1992	(84,508) <sup>r</sup>	448,164	532,665	31,356	45,018	13,662
1993	(115,568)	465,091	580,659	27,235	39,418	12,183
1994	(150,630)	512,626	663,256	25,010	37,373	12,363
1995	(158,801) <sup>r</sup>	584,742	743,543 <sup>r</sup>	21,561	33,071	11,509
1996	(170,214)	625,075	795,289	26,602	40,270	13,668
1997	(181,488)	689,182	870,671	32,239	50,374	18,134
1998	(231,100)	682,497	913,597	40,960	64,071	23,110

Source: Bureau of the Census, Foreign Trade Division and Aerospace Industries Association, based on data from International Trade Administration.

NOTE: The Commerce Department began reporting international trade using the Harmonized Tariff Schedules of the United States in 1989. Previous years based on the Tariff Schedules of the United States Annotated.

a Total U.S. and aerospace foreign trade are reported as (1) exports of domestic merchandise, including Department of Defense shipments and undocumented exports to Canada, f.a.s. (= free alongside ship) basis, (2) imports for consumption, customs value basis.

b First U.S. trade deficit since 1888.

r Revised.

## TOTAL U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1964–1998

(Millions of Dollars)

Year	TOTAL Exports of U.S. Merchandise <sup>a</sup>	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Total	Trans- ports	
1964	\$ 25,690	\$ 1,608	6.3%	\$ 764	\$ 211	\$ 844
1965	26,699	1,618	6.1	854	353	764
1966	29,379	1,673	5.7	1,035	421	638
1967	30,934	2,248	7.3	1,380	611	868
1968	34,063	2,994	8.8	2,289	1,200	705
1969	37,332	3,138	8.4	2,027	947	1,111
1970	43,176	3,405	7.9	2,516	1,283	889
1971	44,087	4,203	9.5	3,080	1,567	1,123
1972	49,854	3,795	7.6	2,954	1,119	841
1973	71,865	5,142	7.2	3,788	1,664	1,354
1974	99,437	7,095	7.1	5,273	2,655	1,822
1975	108,856	7,792	7.2	5,324	2,397	2,468
1976	116,794	7,843	6.7	5,677	2,468	2,166
1977	123,182	7,581	6.2	5,049	1,936	2,532
1978	145,847	10,001	6.9	6,018	2,558	3,983
1979	186,363	11,747	6.3	9,772	4,998	1,975
1980	225,566	15,506	6.9	13,248	6,727	2,258
1981	238,715	17,634	7.4	13,312	7,180	4,322
1982	216,442	15,603	7.2	9,608	3,834	5,995
1983	205,639	16,065	7.8	10,595	4,683	5,470
1984	223,976	15,008	6.7	9,659	3,195	5,350
1985	218,815	18,725	8.6	12,942	5,518	5,783
1986	227,159	19,728	8.7	14,851	6,276	4,875
1987	254,122	22,480	8.8	15,768	6,377	6,714
1988	322,426	26,947	8.4	20,298	8,766	6,651
1989	363,812	32,111	8.8	25,619	12,313	6,492
1990	393,592	39,083	9.9	31,517	16,691	7,566
1991	421,730	43,788	10.4	35,548	20,881	8,239
1992	448,164	45,018	10.0	36,906	22,379	8,111
1993	465,091	39,418	8.5	31,823	18,146	7,596
1994	512,626	37,373	7.3	30,050	15,931	7,322
1995	584,742	33,071	5.7	25,079	10,606	7,991
1996	625,075	40,270	6.4	29,477	13,624	10,792
1997	689,182	50,374	7.3	40,075	21,028	10,299
1998	682,497	64,071	9.4	51,999	29,168	12,072

Source: Bureau of the Census, Foreign Trade Division and Aerospace Industries Association, based on data from International Trade Administration.

NOTE: International trade reported using Harmonized Tariff Schedules after 1988.

a Includes DoD shipments and undocumented exports to Canada, free alongside ship basis.

## U.S. EXPORTS OF AEROSPACE PRODUCTS<sup>a</sup> BY MAJOR COUNTRIES OF DESTINATION

Calendar Years 1994–1998  
(Millions of Dollars)

Major Countries of Destination	1994	1995	1996	1997	1998
Australia .....	\$ 812	\$ 635	\$ 939	\$ 885	\$1,050
Brazil .....	483	584	715	1,045	1,461
Canada .....	1,827	2,259	2,704	2,796	3,107
China .....	2,047	1,250	1,705	2,256	3,731
Finland .....	159	162	1,239	450	602
France .....	2,857	1,846	2,013	2,688	4,286
Germany .....	1,612	1,701	1,907	2,519	4,214
Israel .....	994	604	473	716	1,595
Italy .....	1,003	1,014	852	629	587
Japan .....	4,099	3,587	3,772	5,071	6,057
Korea, South .....	1,782	2,358	2,293	2,479	1,888
Malaysia .....	990	287	330	1,440	1,382
Netherlands.....	1,643	2,096	1,368	1,468	1,037
Saudi Arabia .....	378	760	1,707	2,625	5,008
Singapore .....	1,839	1,544	1,612	2,030	2,296
Switzerland .....	443	349	1,707	998	787
Taiwan.....	1,790	1,961	1,535	2,407	2,915
Thailand .....	336	395	1,032	1,186	824
Turkey .....	886	457	280	541	883
United Kingdom.....	3,601	2,700	3,400	6,471	7,569

Source: U.S. Department of Commerce, International Trade Administration.

a Includes all civil products, free alongside ship basis; excludes military products whose country of destination are not reported.

## U.S. IMPORTS OF AEROSPACE PRODUCTS<sup>a</sup> BY MAJOR COUNTRIES OF ORIGIN

Calendar Years 1994–1998  
(Millions of Dollars)

Major Countries of Origin	1994	1995	1996	1997	1998
Brazil .....	\$ 73	\$ 110	\$ 154	\$ 371	\$ 917
Canada .....	2,443	2,461	3,233	3,800	4,867
France .....	4,087	3,072	3,043	4,087	5,814
Germany .....	699	826	1,039	1,187	2,044
Israel .....	257	354	443	439	493
Italy .....	274	348	405	480	643
Japan .....	583	671	1,081	1,728	2,148
Netherlands.....	505	308	142	227	225
Singapore .....	180	164	204	276	325
Sweden .....	96	185	342	287	306
United Kingdom.....	2,546	2,236	2,634	4,034	5,173

Source: U.S. Department of Commerce, International Trade Administration.

a Includes civil and military products, c.i.f. (Cost, Insurance, and Freight) basis.



**U.S. EXPORTS OF AEROSPACE PRODUCTS**

Calendar Years 1995–1998  
(Millions of Dollars)

Aerospace Exports	1995	1996	1997	1998
<b>TOTAL</b> .....	\$33,071	\$40,270	\$50,374	\$64,071
<b>TOTAL CIVIL</b> .....	\$25,079	\$29,477	\$40,075	\$51,999
<b>Complete Aircraft—TOTAL</b> .....	<u>\$12,275</u>	<u>\$15,111</u>	<u>\$23,112</u>	<u>\$31,427</u>
Transports.....	10,606	13,624	21,028	29,168
General Aviation <sup>a</sup> .....	593	598	946	813
Helicopters .....	170	212	207	148
Used Aircraft .....	876	653	909	1,270
Other, Incl. Spacecraft <sup>b</sup> .....	466	429	520	698
<b>Aircraft Engines—TOTAL</b> .....	<u>1,750</u>	<u>1,996</u>	<u>2,092</u>	<u>3,158</u>
Turbine Engines .....	1,661	1,912	1,995	3,071
Piston Engines .....	89	84	97	87
<b>Aircraft and Engine Parts Incl. Spares—TOTAL</b> .....	<u>10,618</u>	<u>11,965</u>	<u>14,373</u>	<u>16,744</u>
Aircraft Parts & Accessories .....	7,059	8,035	9,196	10,840
Aircraft Engine Parts .....	3,559	3,930	5,177	5,904
<b>TOTAL MILITARY</b> .....	\$ 7,991	\$10,792	\$10,299	\$12,072
<b>Complete Aircraft—TOTAL<sup>c</sup></b> .....	<u>\$ 1,339</u>	<u>\$ 3,859</u>	<u>\$ 2,397</u>	<u>\$ 3,821</u>
Fighters & Fighter Bombers .....	228	3,105	1,823	2,514
Transports.....	453	60	—	618
Helicopters .....	563	366	391	360
Used Aircraft .....	63	310	133	213
Other, Incl. Spacecraft <sup>b</sup> .....	431	315	507	697
<b>Aircraft Engines—TOTAL</b> .....	<u>191</u>	<u>274</u>	<u>388</u>	<u>367</u>
Turbine Engines .....	131	213	255	256
Piston Engines .....	60	62	132	111
<b>Aircraft and Engine Parts Incl. Spares—TOTAL</b> .....	<u>4,582</u>	<u>5,164</u>	<u>5,911</u>	<u>6,382</u>
Aircraft Parts & Accessories .....	3,934	4,543	5,000	5,311
Aircraft Engine Parts .....	648	621	911	1,071
<b>Guided Missiles, Rockets, &amp; Parts—TOTAL</b> .....	<u>1,481</u>	<u>1,199</u>	<u>1,146</u>	<u>923</u>
Guided Missiles & Rockets .....	702	504	453	491
Missile & Rocket Parts .....	759	684	690	431
Missile & Rocket Engines .....	20	11	3	2
Missile & Rocket Engine Parts ...	—	—	—	—

Source: Aerospace Industries Association, based on data from International Trade Administration.

a All fixed-wing aircraft under 33,000 pounds.

b Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, aircraft herein have been predominantly civil. Also, spacecraft not included in "Complete Aircraft—Total."

c Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

## U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1995–1998

(Millions of Dollars)

Aerospace Imports	1995	1996	1997	1998
<b>TOTAL</b> .....	\$ 11,509	\$ 13,668	\$ 18,134	\$ 23,110
<b>TOTAL CIVIL</b> .....	\$ 8,296	\$ 9,881	\$ 12,976	\$ 16,837
<b>Complete Aircraft—TOTAL</b> .....	\$ 3,492	\$ 3,924	\$ 4,656	\$ 6,933
Transports .....	972	823	1,067	2,405
General Aviation .....	1,449	2,136	2,514	3,530
Helicopters .....	300	361	460	536
Other, Including Used Aircraft, & Gliders, Balloons, & Airships <sup>a</sup> ...	771	604	615	461
<b>Aircraft Engines—TOTAL</b> .....	931	1,019	1,491	2,039
Turbine Engines <sup>b</sup> .....	887	969	1,471	2,006
Piston Engines .....	44	50	20	33
<b>Aircraft &amp; Engine Parts—TOTAL</b> ...	3,873	4,939	6,829	7,866
Aircraft Parts and Accessories <sup>b</sup> .....	2,252	2,945	4,183	4,901
Turbine Engine Parts <sup>b</sup> .....	1,416	1,777	2,298	2,688
Piston Engine Parts .....	63	85	114	130
Spacecraft, Other Parts & Accessories <sup>c</sup> .....	142	133	234	147
<b>TOTAL MILITARY</b> .....	\$ 3,213	\$ 3,787	\$ 5,159	\$ 6,273
<b>Complete Aircraft—TOTAL</b> .....	\$ 64	\$ 24	\$ 13	\$ 6
<b>Aircraft Engines—TOTAL</b> .....	907	1,001	1,510	2,037
Turbine Engines <sup>b</sup> .....	887	969	1,471	2,006
Piston Engines Including Parts .....	20	33	38	31
<b>Aircraft &amp; Engine Parts—TOTAL</b> ...	2,242	2,762	3,636	4,230
Aircraft Parts <sup>b</sup> .....	613	748	1,000	1,252
Turbine Engine Parts <sup>b</sup> .....	1,391	1,771	2,296	2,737
Spacecraft, Missiles, Rockets, Other Parts, & Accessories <sup>bc</sup> .....	238	242	340	240

Source: Aerospace Industries Association, based on data from International Trade Administration.

NOTE: International trade reported using Harmonized Tariff Schedules after 1989.

a Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, these products have been predominantly civil.

b Category contains products whose use (civil or military) is unspecified by the Harmonized Tariff Schedules. Figures for those products distributed equally between civil and military.

c Includes satellites, propulsion engines, and parachutes.

**U.S. EXPORTS OF MILITARY AIRCRAFT<sup>a</sup>**  
**Calendar Years 1994–1998**

	1994	1995	1996	1997	1998
<b>TOTAL NUMBER OF AIRCRAFT.....</b>	437	516	429	396	364
Fighters and Fighter Bombers .....	14	16	78	45	65
Transports .....	3	7	3	—	12
Helicopters .....	88	47	41	71	29
New Aircraft, NEC.....	241	387	194	221	163
Used or Rebuilt Aircraft .....	91	59	113	59	95
<b>TOTAL VALUE (Millions of Dollars)</b>	<b>\$1,094</b>	<b>\$1,339</b>	<b>\$3,859</b>	<b>\$2,397</b>	<b>\$3,821</b>
Fighters and Fighter Bombers .....	\$ 248	\$ 228	\$3,105	\$1,823	\$2,514
Transports .....	140	453	60	—	618
Helicopters .....	410	563	366	391	360
New Aircraft, NEC.....	28	33	19	49	119
Used or Rebuilt Aircraft .....	268	63	310	133	213

Source: Aerospace Industries Association, based on data from the International Trade Administration.

<sup>a</sup> Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

NEC Not elsewhere classified.

**U.S. EXPORTS OF CIVIL AIRCRAFT**  
**Calendar Years 1994–1998**

Civil Aircraft Exports	1994	1995	1996	1997	1998
<b>TOTAL NUMBER OF AIRCRAFT<sup>a</sup> ...</b>	1,400	1,323	1,309	1,431	1,518
<b>Helicopters—TOTAL.....</b>	<u>154</u>	<u>210</u>	<u>214</u>	<u>259</u>	<u>238</u>
Under 2,200 lbs .....	118	159	158	199	196
Over 2,200 lbs .....	36	51	56	60	42
<b>General Aviation—TOTAL .....</b>	<u>385</u>	<u>363</u>	<u>383</u>	<u>409</u>	<u>399</u>
Single-Engine .....	125	132	146	188	208
Multi-Engine, Under 4,400 lbs .....	124	95	88	35	64
Multi-Engine, 4,400-10,000 lbs ...	67	76	94	102	48
Multi-Engine, 10,000-33,000 lbs ...	69	60	55	84	79
<b>Transports—TOTAL .....</b>	<u>222</u>	<u>137</u>	<u>172</u>	<u>252</u>	<u>375</u>
Passenger Aircraft, Over 33,000 lbs.....	216	128	157	239	362
Cargo Aircraft, Over 33,000 lbs ...	4	7	10	10	13
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi .....	2	2	5	3	—
<b>Other Aircraft—TOTAL<sup>a</sup> .....</b>	<u>639</u>	<u>613</u>	<u>540</u>	<u>511</u>	<u>506</u>
Used or Rebuilt Aircraft.....	639	613	540	511	506
Other Aircraft, Including Balloons, Gliders, & Kites .....	524	398	508	452	526
<b>TOTAL VALUE (Millions of Dollars)</b>	\$17,737	\$12,275	\$15,111	\$23,112	\$31,427
<b>Helicopters—TOTAL.....</b>	\$ <u>82</u>	\$ <u>170</u>	\$ <u>212</u>	\$ <u>207</u>	\$ <u>148</u>
Under 2,200 lbs .....	24	34	27	32	47
Over 2,200 lbs .....	58	137	185	175	101
<b>General Aviation—TOTAL .....</b>	<u>598</u>	<u>593</u>	<u>598</u>	<u>946</u>	<u>813</u>
Single-Engine .....	46	74	66	90	100
Multi-Engine, Under 4,400 lbs .....	23	22	18	14	21
Multi-Engine, 4,400-10,000 lbs ...	182	176	245	349	206
Multi-Engine, 10,000-33,000 lbs ...	348	321	269	493	486
<b>Transports—TOTAL .....</b>	<u>15,931</u>	<u>10,606</u>	<u>13,624</u>	<u>21,028</u>	<u>29,168</u>
Passenger Aircraft, Over 33,000 lbs.....	15,063	9,354	11,949	19,266	27,700
Cargo Aircraft, Over 33,000 lbs ...	556	930	897	1,251	1,468
Other, Over 33,000 lbs, Incl. Pass./Cargo Combi .....	312	321	778	512	—
<b>Other Aircraft—TOTAL .....</b>	<u>1,126</u>	<u>906</u>	<u>678</u>	<u>932</u>	<u>1,298</u>
Used or Rebuilt Aircraft.....	1,111	876	653	909	1,270
Other Aircraft, Including Balloons, Gliders, & Kites .....	14	29	25	22	28

Source: Aerospace Industries Association, based on data from International Trade Administration.

NOTE: International trade reported using Harmonized Tariff Schedules after 1988.

a Numbers of gliders, balloons, & kites excluded from civil aircraft totals.

**U.S. IMPORTS OF COMPLETE AIRCRAFT**  
**Calendar Years 1995–1998**

Aircraft Imports	1995	1996	1997	1998
<b>TOTAL NUMBER OF AIRCRAFT</b> .....	1,609	1,646	1,711	2,024
<b>Civil Aircraft—TOTAL</b> .....	<u>1,492</u>	<u>1,623</u>	<u>1,685</u>	<u>1,997</u>
New Complete Aircraft:				
Helicopters .....	206	183	240	274
General Aviation:				
Single-Engine .....	117	100	99	102
Multi-Engine, Under 4,400 lbs .....	5	—	2	4
Multi-Engine, 4,400-10,000 lbs .....	2	1	2	3
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs .....	72	96	114	171
Multi-Engine, Other, Including Turbohaft, 10,000-33,000 lbs ...	63	90	65	60
Transports, Multi-Engine, Over 33,000 lbs .....	22	19	27	67
Other Civil Aircraft:				
Gliders <sup>a</sup> .....	137	144	145	169
Balloons & Airships <sup>a</sup> .....	98	200	181	170
Others including Kites <sup>a</sup> .....	509	410	513	666
Used or Rebuilt .....	261	380	297	311
<b>Military Aircraft—TOTAL</b> .....	<u>117</u>	<u>23</u>	<u>26</u>	<u>27</u>
New Complete Aircraft .....	75	14	4	7
Used or Rebuilt .....	42	9	22	20

(Continued on next page)

## U.S. IMPORTS OF COMPLETE AIRCRAFT

(Continued)

Aircraft Imports	1995	1996	1997	1998
<b>VALUE</b> (Millions of Dollars).....	\$3,556.5	\$3,947.7	\$4,669.0	\$6,939.0
<b>Civil Aircraft—TOTAL</b> .....	<u>\$3,492.6</u>	<u>\$3,923.5</u>	<u>\$4,655.7</u>	<u>\$6,932.7</u>
New Complete Aircraft:				
Helicopters .....	300.2	360.9	460.1	535.7
General Aviation:				
Single-Engine .....	48.5	57.8	71.8	81.3
Multi-Engine, under 4,400 lbs	0.3	—	0.2	3.6
Multi-Engine, 4,400-10,000 lbs	3.0	8.0	5.4	6.4
Multi-Engine, Turbojet/Turbofan, 10,000-33,000 lbs .....	902.4	1,286.6	1,795.2	2,860.8
Multi-Engine, Other, including Turbopshaft, 10,000-33,000 lbs	494.6	783.9	641.1	578.3
Transports, Multi-Engine, over 33,000 lbs .....	972.1	822.5	1,066.7	2,405.4
Other <sup>†</sup> Civil Aircraft:				
Gliders <sup>a</sup> .....	1.0	1.7	1.8	2.3
Balloons & Airships <sup>a</sup> .....	11.5	13.0	7.5	12.2
Others including Kites <sup>a</sup> .....	2.0	1.4	2.2	3.6
Used or Rebuilt .....	756.9	587.8	603.7	443.1
<b>Military Aircraft—TOTAL</b> .....	<u>\$ 63.9</u>	<u>\$ 24.2</u>	<u>\$ 13.3</u>	<u>\$ 6.3</u>
New Complete Aircraft .....	63.0	4.7	2.3	1.0
Used or Rebuilt .....	0.9	19.5	11.0	5.3

Source: Aerospace Industries Association, based on data from International Trade Administration.

a Products within this category are not designated civil or military by the Harmonized Tariff Schedules. Historically, these products have been predominantly civil.

**U.S. EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT<sup>a</sup>**  
**Calendar Years 1994–1998**

<b>Region of Destination</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>TOTAL NUMBER EXPORTED ...</b>	222	137	172	252	375
Canada & Greenland .....	—	3	3	—	—
Latin America & Caribbean .....	8	5	7	11	23
Europe .....	82	52	52	91	150
Middle East .....	13	1	5	18	36
Asia .....	108	71	97	123	150
Oceania .....	7	2	6	5	9
Africa .....	4	3	2	4	7
<b>TOTAL VALUE</b> (Millions of Dollars) .....	\$15,931	\$10,606	\$13,624	\$21,028	\$29,168
Canada & Greenland .....	\$ —	\$ 280	\$ 225	\$ —	\$ —
Latin America & Caribbean .....	420	390	566	505	1,215
Europe .....	5,451	3,502	3,628	7,538	9,885
Middle East .....	957	157	543	2,449	3,871
Asia .....	8,451	6,049	8,110	9,916	12,894
Oceania .....	510	126	398	473	628
Africa .....	144	102	155	147	674

Source: Aerospace Industries Association, based on data from the International Trade Administration.

a Airframe weight exceeding 33,000 pounds.

**U.S. EXPORTS OF CIVIL HELICOPTERS<sup>a</sup>**  
**Calendar Years 1994–1998**

Region of Destination	1994	1995	1996	1997	1998
<b>TOTAL NUMBER EXPORTED</b> .....	154	210	214	259	238
Canada & Greenland .....	5	9	7	9	6
Latin America & Caribbean .....	43	36	26	36	57
Europe .....	62	55	64	100	133
Middle East .....	2	4	2	2	—
Asia .....	26	50	78	61	26
Oceania .....	11	25	25	48	14
Africa .....	5	31	12	3	2
<b>TOTAL VALUE</b> (Millions of Dollars) .....	\$82.1	\$170.4	\$212.1	\$207.1	\$148.1
Canada & Greenland .....	\$ 1.9	\$ 7.9	\$ 4.3	\$ 4.4	\$ 8.4
Latin America & Caribbean .....	20.0	21.1	6.6	21.9	25.6
Europe .....	18.7	24.3	24.3	56.5	65.8
Middle East .....	0.6	9.3	0.0	1.1	—
Asia .....	30.8	83.6	164.7	116.3	43.4
Oceania .....	9.0	19.0	9.4	4.6	4.7
Africa .....	1.2	5.3	2.9	2.4	0.3

Source: Aerospace Industries Association, based on data from the International Trade Administration.

a Excludes used helicopters.

**U.S. IMPORTS OF CIVIL HELICOPTERS<sup>a</sup>**  
**Calendar Years 1994–1998**

Country of Origin	1994	1995	1996	1997	1998
<b>TOTAL NUMBER IMPORTED</b> .....	216	206	183	240	274
Canada .....	169	172	154	204	189
France .....	29	11	16	26	56
Germany .....	14	15	9	9	12
Italy .....	2	7	4	1	11
Others <sup>b</sup> .....	2	61	—	—	6
<b>TOTAL VALUE</b> (Millions of Dollars) .....	\$316.7	\$300.2	\$360.9	\$460.1	\$535.7
Canada .....	\$274.6	\$262.9	\$321.8	\$415.3	\$419.1
France .....	29.6	10.3	20.1	23.7	60.4
Germany .....	11.7	14.9	8.8	18.3	27.8
Italy .....	0.0	12.1	10.1	2.9	27.4
Others <sup>b</sup> .....	0.8	0.0	—	—	1.0

Source: Aerospace Industries Association, based on data from the International Trade Administration.

a Excludes used helicopters.

b Includes 2 from United Kingdom in 1994; 1 from Israel in 1995; and 2 from Australia, 2 from Japan, 1 from Papua New Guinea, and 1 from Poland in 1998.



**U.S. EXPORTS OF GENERAL AVIATION AIRCRAFT<sup>a</sup>**  
**Calendar Years 1994–1998**

<b>Region of Destination</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
<b>TOTAL NUMBER EXPORTED .....</b>	<b>385</b>	<b>363</b>	<b>383</b>	<b>409</b>	<b>399</b>
Canada & Greenland .....	29	32	32	31	25
Latin America & Caribbean .....	81	70	67	117	117
Europe .....	94	135	123	131	140
Middle East .....	28	10	14	1	10
Asia .....	91	38	49	44	35
Oceania .....	25	39	40	45	36
Africa .....	37	39	58	40	36
<b>TOTAL VALUE</b> (Millions of Dollars) .....	<b>\$598.2</b>	<b>\$593.4</b>	<b>\$597.5</b>	<b>\$945.9</b>	<b>\$813.0</b>
Canada & Greenland .....	\$ 44.9	\$ 75.8	\$ 73.7	\$116.0	\$101.4
Latin America & Caribbean .....	203.1	123.0	98.6	282.0	192.8
Europe .....	128.1	122.6	160.8	220.9	256.0
Middle East .....	13.0	31.2	17.0	10.8	11.9
Asia .....	112.6	140.7	92.1	156.5	137.8
Oceania .....	51.7	47.0	85.5	74.4	52.3
Africa .....	44.9	53.1	69.7	85.3	60.8

Source: Aerospace Industries Association, based on data from the International Trade Administration.  
 a All fixed-wing aircraft under 33,000 pounds.

**U.S. IMPORTS OF GENERAL AVIATION AIRCRAFT<sup>a</sup>**  
**Calendar Years 1994–1998**

Country of Origin	1994	1995	1996	1997	1998
<b>TOTAL NUMBER IMPORTED ...</b>	261	259	287	282	340
Brazil .....	7	11	24	21	58
Canada .....	50	32	66	87	104
France .....	63	40	29	50	57
Germany .....	41	52	34	38	27
Israel .....	5	3	8	5	9
Poland .....	23	23	14	10	13
Russia .....	14	18	10	4	4
Sweden .....	—	2	25	19	20
Switzerland .....	6	16	22	25	30
United Kingdom.....	40	44	43	14	1
Other .....	12	18	12	9	17
<b>TOTAL VALUE</b> (Millions of Dollars) .....	\$1,711.0	\$1,448.8	\$2,136.2	\$2,513.7	\$3,530.4
Brazil .....	\$ 49.5	\$ 74.7	\$ 124.0	\$ 256.5	\$ 782.6
Canada .....	625.4	494.6	957.8	1,155.2	1,521.9
France .....	556.3	278.8	377.3	748.6	857.3
Germany .....	156.8	242.5	88.3	26.1	39.6
Israel .....	29.7	21.4	66.1	40.0	81.8
Poland .....	1.9	2.2	1.6	1.3	1.9
Russia .....	1.7	1.0	0.8	0.2	0.4
Sweden .....	—	23.0	212.7	153.5	176.6
Switzerland .....	10.8	32.4	46.6	57.0	66.8
United Kingdom.....	277.7	276.5	260.2	74.8	0.1
Other .....	1.3	1.6	0.9	0.6	1.3

Source: Aerospace Industries Association, based on data from the International Trade Administration.

a All fixed-wing aircraft under 33,000 pounds.

**U.S. EXPORTS OF AIRCRAFT ENGINES**

Calendar Years 1996-1998  
(Values in Millions of Dollars)

	1996		1997		1998	
	Number	Value	Number	Value	Number	Value
<b>TOTAL</b> .....	11,842	\$2,270	22,436	\$2,479	17,262	\$3,525
<b>Turbine Engines</b> .....	<u>4,312</u>	<u>\$2,124</u>	<u>4,679</u>	<u>\$2,250</u>	<u>6,339</u>	<u>\$3,327</u>
Civil .....	3,362	1,912	3,259	1,995	4,249	3,071
Military .....	950	213	1,420	255	2,090	256
<b>Piston Engines</b> .....	<u>7,530</u>	<u>146</u>	<u>17,757</u>	<u>229</u>	<u>10,923</u>	<u>198</u>
Civil, New, Under 500 HP .....	706	17	630	15	806	20
Civil, New, Over 500 HP ... ..	140	4	315	14	268	5
Civil, Used .....	2,605	64	2,054	68	2,843	62
Military .....	4,079	62	14,758	132	7,006	111

Source: Aerospace Industries Association, based on data from the International Trade Administration.

**U.S. IMPORTS OF AIRCRAFT ENGINES<sup>a</sup>**

Calendar Years 1996-1998  
(Values in Millions of Dollars)

	1996		1997		1998	
	Number	Value	Number	Value	Number	Value
<b>TOTAL</b> .....	8,428	\$2,007	6,347	\$2,987	6,586	\$4,058
<b>Turbine Engines</b> .....	2,693	\$1,937	3,019	\$2,943	3,211	\$4,012
<b>Piston Engines</b> .....	<u>5,735</u>	<u>70</u>	<u>3,328</u>	<u>45</u>	<u>3,375</u>	<u>46</u>
Military .....	2,682	20	2,859	25	2,760	13
Civil, New, Small .....	247	1	167	1	178	2
Civil, New, Large .....	2,605	41	99	2	114	5
Civil, Used .....	201	8	203	17	323	26

Source: Aerospace Industries Association, based on data from the International Trade Administration.

<sup>a</sup> New and used.

**EXPORT-IMPORT BANK LENDING AUTHORITY  
AND GROSS AUTHORIZATIONS SUMMARY**

Fiscal Years 1985–1998  
(Millions of Dollars)

**LOANS**

Year	Lending Authority	Authorizations Summary		
		Direct Loans <sup>a</sup>		
		TOTAL	Direct Credits	Other <sup>b</sup>
1985	\$ 3,865	\$ 659	\$ 320	\$ 339
1986	1,059	578	371	207
1987	680	599	332	267
1988	693	685	465	220
1989	719	695	517	202
1990	614	614	318	296
1991	750	777	425	352
1992	(c)	817	661	156
1993	(c)	1,748	1,635	113
1994	(c)	3,016	2,980	37
1995	(c)	1,598	1,271	327
1996	(c)	1,236	1,220	16
1997	(c)	1,549	1,465	84
1998	(c)	103	69	34

**GUARANTEES AND INSURANCE**

Year	Lending Authority	Authorizations Summary		
		TOTAL	Guarantees	Insurance
1985	\$10,000	\$ 7,850	\$1,320	\$6,530
1986	11,484 <sup>d</sup>	5,508	1,128	4,380
1987	11,355	7,958	1,514	6,444
1988	13,406	5,735	601	5,134
1989	17,901	5,637	1,292	4,345
1990	10,191	8,174	3,333	4,841
1991	11,349	10,588	6,034	4,554
1992	(c)	11,521	7,301	4,220
1993	(c)	13,324	9,095	4,229
1994	(c)	11,870	7,609	4,261
1995	(c)	10,267	5,712	4,555
1996	(c)	10,280	6,412	3,868
1997	(c)	10,610	7,761	2,849
1998	(c)	10,447	6,151	4,296

Source: Export-Import Bank of the United States.

a The value of Direct Loans may exceed Lending Authority because of the inclusion in Direct Loans of the full amount of Certificates of Loan, portions of which are subsequently sold to commercial banks.

b Includes discount loans, medium term, and small business credits.

c No lending limit set on the value of loans or guarantees and insurance beginning with 1992. Instead the subsidy cost of these transactions limited to \$603 million in 1992 and \$757 million in 1993. However, in 1993, the combined value of loans, guarantees, and insurance transactions could not exceed \$15.5 billion.

d Includes \$1.800 million proposed I-MATCH Program which would replace direct lending and would allow an estimated \$100 million in commercial loan interest buy-down.

**EXPORT-IMPORT BANK**  
**TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES**  
**AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS**  
**Fiscal Years 1984–1998**  
**(Millions of Dollars)**

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft <sup>a</sup>	Other Aircraft <sup>b</sup>
<b>LOANS<sup>c</sup></b>					
1984	\$1,465	\$ 608.0	41.5%	\$ 531.8	\$ 76.2
1985	659	39.7	6.0	12.6	27.1
1986	578	54.6	9.4	46.4	8.2
1987	599	17.0	2.8	13.3	3.7
1988	685	—	—	—	—
1989	695	166.4	23.9	158.0	8.4
1990	614	5.0	0.8	—	5.0
1991	777	—	—	—	—
1992	817	—	—	—	—
1993	1,748	—	—	—	—
1994	3,016	—	—	—	—
1995	1,598	—	—	—	—
1996	1,236	—	—	—	—
1997	1,549	—	—	—	—
1998	103	—	—	—	—
<b>GUARANTEES</b>					
1984	\$1,333	\$ 355.5	26.7%	\$ 293.5	\$ 62.0
1985	1,320	322.4	24.4	288.9	33.5
1986	1,128	329.2	29.2	277.4	51.8
1987	1,514	808.3	53.4	808.3	—
1988	601	89.2	14.8	73.4	15.8
1989	1,292	496.4	38.4	390.4	106.0
1990	3,333	1,666.3	50.0	224.7	1,441.6
1991	6,034	606.0	10.1	566.9	40.0
1992	7,301	1,667.0	22.8	1,597.1	69.9
1993	9,095	3,488.6	38.4	3,488.6	—
1994	7,609	2,959.0	38.9	2,959.0	—
1995	5,712	977.0	17.1	977.0	—
1996	6,412	1,155.0	18.0	1,155.0	—
1997	7,761	1,959.0	25.2	1,959.0	—
1998	6,151	2,542.5	41.3	2,542.5	—

Source: Export-Import Bank of the United States.

a Includes complete aircraft, engines, parts, and retrofits.

b Includes business aircraft, general aviation aircraft, helicopters, and related products and services.

c Loans are commitments for financing by the Eximbank to foreign buyers of U.S. equipment and services, which are made to commercial banks and may subsequently be guaranteed by the Eximbank, in which case the value of the loans is also included with Guarantees.

d Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions. Excludes insurance.

**EXPORT-IMPORT BANK  
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS  
FOR LOANS<sup>a</sup> AND GUARANTEES<sup>b</sup>**

Fiscal Years 1976–1998  
(Values in Millions of Dollars)

Year	No. of Jet Aircraft <sup>c</sup>		Export Value <sup>c</sup>		No. of New Commitments		Gross Authorizations	
	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees	Loans	Guarantees
<b>New Authorizations:</b>								
1976	77	6	\$1,017	\$ 139	34	11	\$ 398	\$ 87
Tr. Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	11	6	441	113	5	2	199	78
1983	21	9	779	619	3	4	384	601
1984	37	8	1,023	327	7	4	532	294
1985	—	14	19	481	1	5	13	289
1986	3	13	74	451	1	9	46	277
1987	—	27	22	1,449	1	14	13	808
1988	—	2	—	94	—	2	—	73
1989	3	5	253	459	1	2	158	390
1990	—	6	—	264	—	2	—	225
1991	—	12	—	665	—	3	—	567
1992	—	37	—	1,889	—	12	—	1,597
1993	—	70	—	4,122	—	27	—	3,489
1994	—	59	—	3,507	—	19	—	2,959
1995	—	27	—	1,205	—	12	—	974
1996	—	18	—	1,089	—	8	—	923
1997	—	34	—	2,357	—	14	—	1,959
1998	—	65	—	3,059	—	24	—	2,543

Source: Export-Import Bank of the United States.

a Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank in which case the value of the loans is included with Guarantees.

b Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

c For Export-Import Bank commitments including both loan and guarantee authorization, number of aircraft and export value reported under "Loans."

Tr. Qtr. See Glossary.

**EXPORT-IMPORT BANK  
AUTHORIZATIONS OF LOANS AND GUARANTEES  
IN SUPPORT OF EXPORTS OF COMMERCIAL JET AIRCRAFT**

Fiscal Years 1997-1998  
(Values in Millions of Dollars)

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorizations				
			Loans (Direct Credits)			Repay- ment Terms <sup>b</sup>	Guar- antees Amount
			Amount	Percent Cover- age <sup>a</sup>	Interest Rate		
<b>FY 1998</b>							
<b>TOTALS</b> .....	34 aircraft	\$3,059	—	—	—	—	\$2,543
Australia/AWAS.....	1 x 737, 1 x 767	\$ 118	—	—	—	—	\$ 100
Chile/Linea Aerea Nacional Chile .....	3 x 767	232	—	—	—	—	189
China/Air China .....	2 x 747, 1 x 777	470	—	—	—	—	446
China/China Eastern Airlines .....	3 x 737, 4 x MD-90	269	—	—	—	—	225
China/China Northern Airlines .....	3 x MD-90	130	—	—	—	—	103
China/China Southwest Airlines .....	2 x 757	88	—	—	—	—	73
China/China Xiamen Airlines .....	4 x 737	141	—	—	—	—	121
China/China Xinjiang Airlines .....	2 x 757	94	—	—	—	—	70
China/Hainan Airlines .....	3 x 737	137	—	—	—	—	111
China/Shandong Airlines ...	2 x 737	65	—	—	—	—	53
China/Shanghai Airlines ...	1 x 767	76	—	—	—	—	65
China/Shenzhen Airlines ...	2 x 737	71	—	—	—	—	61
China/Wuhan Airlines .....	1 x 737	33	—	—	—	—	23
Czech Republic/ Czech Airlines .....	3 x 737	101	—	—	—	—	82
Fiji Islands/Air Pacific .....	3 x 737	134	—	—	—	—	109
India/Special Purpose Entity	4 x 737	128	—	—	—	—	107
Kenya/Kenya Airways .....	1 x 737	31	—	—	—	—	26

(Continued on next page)

**EXPORT-IMPORT BANK  
LOAN AND GUARANTEE AUTHORIZATIONS  
(Continued)**

Customer (Country/Airline)	Number and Aircraft Model or Related Product	Export Value	Authorizations				
			Loans (Direct Credits)			Repay- ment Terms <sup>b</sup>	Guar- antees Amount
			Amount	Percent Cover- age <sup>a</sup>	Interest Rate		
<b>FY 1998 (continued)</b>							
Morocco/Royal Air Maroc	2 x 737	\$ 78	—	—	—	—	\$ 67
Russia/Aeroflot Russian Int'l Air .....	10 x 737	406	—	—	—	—	302
Turkey/Pegasus Airlines ...	1 x 737	35	—	—	—	—	24
Turkey/Turk Hava Yollari Tao .....	6 x 737	222	—	—	—	—	184
<b>FY 1997</b>							
<b>TOTALS</b> .....	<b>34 aircraft</b>	<b>\$2,357</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>\$1,959</b>
China/Air China Airlines ...	2 x 747	\$ 270	—	—	—	—	\$ 224
China/China Northern Airlines .....	3 x MD-90	123	—	—	—	—	101
Czech Republic/ Czech Airlines .....	3 x 737	78	—	—	—	—	63
India/Air India .....	2 x 747	303	—	—	—	—	244
Kenya/Kenya Airways .....	2 x 737	62	—	—	—	—	53
Korea/Asian Airlines .....	1 x 737, 1 x 747, 4 x 767	537	—	—	—	—	446
Korea/Korean Airlines .....	1 x 747, 2 x 777	372	—	—	—	—	310
Morocco/Royal Air Maroc	1 x 737	28	—	—	—	—	22
Poland/LOT Polish Airlines	4 x 737, 1 x 767	230	—	—	—	—	197
Turkey/Onur Air Tasimacilik .....	5 x MD-88	155	—	—	—	—	132
Uzbekistan/Special .....	2 x 767	200	—	—	—	—	168

Source: Aerospace Industries Association, based on data from the Export-Import Bank of the United States.

NOTE: For definitions of Loans and Guarantees, see Export-Import Bank tables on previous pages.

a Amount of loan as percent of export value.

b Number of payments and frequency (S=semi-annual).



# EMPLOYMENT

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Aerospace industry employment entered its second year of growth in 1998 following six years of contraction. On an annual average employment basis, the industry's labor force grew by 34,000 workers, reaching a total of 893,000, a gain of 4.0% over the previous year. Hiring in the aircraft manufacturing sector accounted for two-thirds of the new jobs.

The 1998 employment figure represented 4.8% of the total employment in all U.S. manufacturing industries; that compares with 4.6% in 1997 and 6.8% at its peak level in the 1989-1990 period. The aerospace workforce also represented 8.0% of total employment by U.S. companies engaged in production of durable goods; the comparable figures were 7.8% in 1997 and 11.7% at its peak level in 1990.

The overall increase in employment was fueled by a gain of 23,000 jobs in the segment of the industry that produces aircraft, engines, and parts; and a gain of 11,000 jobs in the catch-all "other" segment that includes communications, navigation, flight control, displays, and related equipment. The missiles and space vehicles segment accounted for another 1,000 new workers.

The total aerospace payroll for 1998 was \$32.9 billion, up from \$31.7 billion the previous year. Both figures include lump-sum payments made by many aerospace companies in lieu of general wage increases or cost-of-living adjustments. Expressed as a percentage of the total payroll of all U.S. manufacturing industries (\$752 billion), the aerospace payroll amounted to 4.4%, same as in 1997.

Average weekly earnings by production workers (again including lump-sum payments) came to \$848, down from \$850 for the previous year. The highest paying jobs among production workers were those in airframe fabrication at \$934 per week. For other segments, the average weekly rate

was \$845 for employees working on missiles and space systems, \$840 for engine and parts workers, and \$752 for those working on aircraft parts and equipment other than engines.

Average hourly earnings amounted to \$19.28, up from \$19.09 in 1997. The average work week for production workers was 44.0 hours, which compares to 44.6 hours in the previous year.

The number of R&D scientists and engineers in the aerospace industry dipped dramatically in 1998 to 77,000 from the previous year's 94,600. Aerospace scientists and engineers accounted for just 8.1% of the 951,500 R&D scientists and engineers employed by all U.S. manufacturing or non-manufacturing industries known to conduct or finance research and development.

After holding fairly steady at around 1 million workers throughout the 1980s and early 1990s, the federal civilian workforce in the Department of Defense (DoD) continued a steady decline that began in 1993. In 1998, DoD federal civilian employment dipped to 732,089 from 771,914 in the previous year, and it is projected to continue falling over the next two years. Employment in NASA programs also dropped to 183,109 in 1998 from 189,070 in the previous year. NASA directly employed 10% of the total; NASA contractors employed approximately 164,000 or the remaining 90%.



**ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING,  
DURABLE GOODS, AND AEROSPACE INDUSTRIES**

Calendar Years 1979-1998  
(Thousands of Employees)

Year	All Manu- facturing Industries	Durable Goods Industries	Aerospace Industry <sup>a</sup>		
			TOTAL	As Percent of	
				All Manufac- turing	Durable Goods
1979	21,040	12,730	1,007	4.8%	7.9%
1980	20,285	12,159	1,080	5.3	8.9
1981	20,170	12,082	1,087	5.4	9.0
1982	18,780	11,014	1,038	5.5	9.4
1983	18,432	10,707	1,019	5.5	9.5
1984	19,372	11,476	1,058	5.5	9.2
1985	19,248	11,458	1,151	6.0	10.1
1986	18,947	11,195	1,241	6.6	11.1
1987	18,999	11,154	1,282	6.8	11.5
1988	19,314	11,363	1,294	6.7	11.4
1989	19,391	11,394	1,314	6.8	11.5
1990	19,076	11,109	1,302	6.8	11.7
1991	18,406	10,569	1,214	6.6	11.5
1992	18,104	10,277	1,100	6.1	10.7
1993	18,075	10,221	966	5.3	9.5
1994	18,321	10,448	855	4.7	8.2
1995	18,524	10,683	796	4.3	7.5
1996	18,495	10,789	796	4.3	7.4
1997 <sup>r</sup>	18,675	11,010	859	4.6	7.8
1998	18,772	11,170	893	4.8	8.0

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

<sup>a</sup> See Glossary for detailed explanation of "Aerospace Employment."

<sup>r</sup> Revised.

## ANNUAL PAYROLL AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1984–1998  
(Millions of Dollars)

Year	All Manufacturing Industries <sup>a</sup>	Aerospace Industry <sup>b</sup>			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other Workers	
1984	\$439,100	\$23,773	\$ 8,746	\$15,027	5.4 %
1985	460,900	26,749	9,837	16,911	5.8
1986	473,200	29,547	11,038	18,509	6.2
1987	490,300	31,101	11,700	19,401	6.3
1988	524,000	32,566	11,744	20,822	6.2
1989	541,800	34,154	12,440	21,714	6.3
1990	556,100	35,590	13,020	22,570	6.4
1991	562,500	34,520	12,536	21,984	6.1
1992	583,500	33,123	11,812	21,311	5.7
1993	593,100	30,391	10,673	19,718	5.1
1994	621,100	28,395	9,901	18,494	4.6
1995	648,400	26,603	9,272	17,331	4.1
1996	674,700	27,987	10,105	17,882	4.1
1997 <sup>r</sup>	719,500	31,575	12,092	19,483	4.4
1998	751,500	32,889	12,738	20,151	4.4

### AEROSPACE — INCLUDING LUMP-SUM PAYMENTS<sup>c</sup>

Year	TOTAL	Production Workers	Other Workers	Aerospace As Percent of All Manufacturing
1984	\$ 23,813	\$ 8,786	\$15,027	5.4 %
1985	26,782	9,871	16,911	5.8
1986	29,611	11,102	18,509	6.3
1987	31,262	11,862	19,401	6.4
1988	32,757	11,935	20,822	6.3
1989	34,396	12,682	21,714	6.3
1990	35,862	13,292	22,570	6.4
1991	34,688	12,704	21,984	6.2
1992	33,257	11,947	21,311	5.7
1993	30,548	10,830	19,718	5.2
1994	28,420	9,926	18,494	4.6
1995	26,618	9,287	17,331	4.1
1996	28,046	10,163	17,882	4.2
1997 <sup>r</sup>	31,664	12,181	19,483	4.4
1998	32,912	12,761	20,151	4.4

Source: Bureau of Economic Analysis, "Survey of Current Business" (Monthly) and Aerospace Industries Association estimates based on Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

a See Glossary for explanation of "Payroll, All Manufacturing."

b Based on combined annual average employment and average weekly earnings for SICs 372 and 376.

c Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3721 & 3761 and are included by AIA in the totals for production workers and all aerospace.

r Revised.

**EMPLOYMENT IN THE AEROSPACE INDUSTRY<sup>a</sup>**

Calendar Years 1984–1998  
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft, Engines, & Parts (SIC 372)	Missiles & Space Vehicles (SIC 376)	Other <sup>b</sup>
<b>TOTAL EMPLOYMENT</b>				
1984	1,058	575	154	329
1985	1,151	616	177	358
1986	1,241	656	200	386
1987	1,282	678	206	399
1988	1,294	684	208	402
1989	1,314	711	194	408
1990	1,302	712	185	405
1991	1,214	669	168	378
1992	1,100	612	146	342
1993	966	542	124	300
1994	855	482	108	266
1995	796	451	98	248
1996	796	458	90	248
1997	859 <sup>r</sup>	501 <sup>r</sup>	91	267
1998	893	524	92	278
<b>PRODUCTION WORKERS</b>				
1984	351	276	52	23
1985	382	295	62	25
1986	417	323	67	28
1987	434	339	67	29
1988	422	331	63	28
1989	432	344	60	29
1990	430	345	57	29
1991	399	324	48	27
1992	355	291	40	24
1993	308	253	35	20
1994	271	222	31	18
1995	252	208	28	17
1996	260	218	25	17
1997	295	251	25 <sup>r</sup>	20
1998	310	265	24	21

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

<sup>a</sup> See Glossary for detailed explanation of "Aerospace Employment."

<sup>b</sup> Communications, navigation, flight control, and displays (aerospace-related portions of SICs 366, 381, & 382).

<sup>r</sup> Revised.

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY<sup>a</sup>

Calendar Years 1984–1998  
(Annual Average, Thousands of Employees)

Year	TOTAL (SIC 372)	Airframes (SIC 3721)	Engines and Parts (SIC 3724)	Other Parts & Equipment (SIC 3728)
<b>TOTAL EMPLOYMENT</b>				
1984	574.9	306.1	140.2	128.7
1985	616.2	325.6	147.5	143.2
1986	655.8	338.9	153.6	163.2
1987	678.0	356.4	158.2	163.4
1988	683.5	368.5	155.8	159.3
1989	711.0	382.2	153.5	175.2
1990	712.3	381.0	151.7	179.5
1991	669.2	355.6	143.2	170.3
1992	611.7	332.1	126.6	153.0
1993	542.0	301.4	109.2	131.4
1994	481.5	271.3	95.1	115.1
1995	450.5	243.6	93.0	113.9
1996	458.1	243.1	94.7	120.4
1997 <sup>r</sup>	500.6	262.4	99.8	138.4
1998	523.7	269.8	103.4	150.5
<b>PRODUCTION WORKERS</b>				
1984	276.0	128.2	73.0	73.3
1985	294.6	135.5	74.8	82.2
1986	322.5	146.6	78.7	94.3
1987	338.5	159.1	80.5	96.3
1988	331.3	162.1	77.1	92.1
1989	343.7	167.4	76.8	99.5
1990	344.6	164.1	77.2	103.2
1991	323.6	151.6	73.1	98.8
1992	291.4	137.8	64.3	89.2
1993	252.5	122.7	53.6	76.2
1994	222.0	108.1	46.9	67.0
1995	207.5	93.6	46.2	67.7
1996	217.7	95.6	48.8	73.3
1997 <sup>r</sup>	251.1	110.1	53.6	87.4
1998	264.9	114.1	54.1	96.6

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

a See Glossary for detailed explanation of "Aerospace Employment."

r Revised.

## AVERAGE HOURLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only  
Calendar Years 1984–1998

Year	TOTAL <sup>a</sup>	Aircraft (SIC 372)			Guided Missiles, Space Vehicles & Parts (SIC 376)	Complete Guided Missiles, & Space Vehicles (SIC 3761)	
		TOTAL <sup>a</sup>	Airframes (SIC 3721)	Engines & Parts (SIC 3724)			Other Parts & Equipment (SIC 3728)
<b>AVERAGE HOURLY EARNINGS<sup>b</sup></b>							
1984	\$12.24	\$12.32	\$12.91	\$12.40	\$11.37	\$11.82	\$12.01
1985	12.54	12.62	13.18	12.85	11.66	12.14	12.36
1986	12.75	12.86	13.48	13.08	11.90	12.20	12.48
1987	13.10	13.17	13.74	13.33	12.23	12.73	13.09
1988	13.48	13.55	14.18	13.80	12.28	13.13	13.53
1989	14.10	14.17	14.89	14.42	12.81	13.70	14.20
1990	14.73	14.79	15.66	14.84	13.37	14.39	14.82
1991	15.51	15.60	16.72	15.38	14.05	14.90	15.21
1992	16.46	16.53	17.70	16.28	14.89	15.99	16.45
1993	17.18	17.23	18.43	16.70	15.72	16.80	17.43
1994	17.89	17.95	19.50	17.31	16.01	17.48	18.29
1995	17.99	18.02	19.97	17.34	15.93	17.74	18.58
1996	18.56	18.57	20.49	18.22	16.42	18.51	19.34
1997 <sup>r</sup>	18.94	18.88	20.76	18.58	16.76	19.53	20.75
1998	19.24	19.17	21.08	18.93	17.06	19.96	21.38

### AVERAGE HOURLY EARNINGS INCLUDING LUMP-SUM WAGE PAYMENTS<sup>c</sup>

1984	\$12.37	\$12.46	\$13.11	\$12.40	\$11.37	\$11.92	\$12.14
1985	12.69	12.77	13.40	12.85	11.66	12.29	12.56
1986	12.94	13.06	13.80	13.08	11.90	12.33	12.66
1987	13.37	13.48	14.32	13.33	12.23	12.80	13.19
1988	13.73	13.79	14.65	13.80	12.28	13.36	13.87
1989	14.37	14.44	15.41	14.42	12.81	13.98	14.63
1990	15.04	15.10	16.32	14.84	13.37	14.67	15.26
1991	15.71	15.81	17.16	15.38	14.05	15.09	15.49
1992	16.67	16.75	18.18	16.28	14.89	16.05	16.54
1993	17.44	17.52	19.00	16.70	15.72	16.83	17.47
1994	17.96	18.02	19.57	17.31	16.01	17.53	18.37
1995	18.05	18.09	20.02	17.34	15.93	17.77	18.62
1996	18.72	18.74	20.79	18.22	16.42	18.51	19.34
1997 <sup>r</sup>	19.09	19.05	21.09	18.58	16.76	19.54	20.76
1998	19.28	19.20	21.14	18.93	17.06	20.09	21.59

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

a TOTAL columns are employment-based weighted averages.

b Includes overtime premiums.

c Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3721 & 3761 and are included by AIA in totals.

r Revised.

## AVERAGE WEEKLY EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only  
Calendar Years 1984–1998

Year	TOTAL <sup>a</sup>	Aircraft (SIC 372)			Guided Missiles, Space Vehicles & Parts (SIC 376)	Complete Guided Missiles, & Space Vehicles (SIC 3761)	
		TOTAL <sup>a</sup>	Airframes (SIC 3721)	Engines & Parts (SIC 3724)			Other Parts & Equipment (SIC 3728)
<b>AVERAGE WEEKLY EARNINGS<sup>b</sup></b>							
1984	\$513	\$516	\$532	\$523	\$486	\$496	\$508
1985	531	534	547	542	506	515	527
1986	545	550	568	561	520	517	533
1987	556	558	578	567	523	541	556
1988	573	575	596	582	529	567	585
1989	593	594	616	616	542	589	611
1990	624	626	656	637	570	612	634
1991	648	651	694	654	583	632	649
1992	685	689	736	689	615	652	666
1993	714	717	756	715	657	696	727
1994	754	756	800	753	688	738	779
1995	758	757	809	770	677	765	812
1996	801	802	859	813	721	790	837
1997 <sup>r</sup>	844	844	918	838	756	842	896
1998	847	847	932	840	752	840	892
<b>AVERAGE WEEKLY EARNINGS INCLUDING LUMP-SUM PAYMENTS<sup>c</sup></b>							
1984	\$515	\$518	\$540	\$523	\$486	\$501	\$514
1985	532	535	556	542	506	521	535
1986	548	553	581	561	520	523	541
1987	563	567	603	567	523	544	561
1988	583	584	615	582	529	577	599
1989	605	605	638	616	542	601	629
1990	637	639	684	637	570	624	653
1991	657	659	712	654	583	640	661
1992	693	698	756	689	615	655	670
1993	725	729	779	715	657	697	728
1994	755	758	802	753	688	740	783
1995	759	758	811	770	677	766	814
1996	806	807	871	813	721	790	837
1997 <sup>r</sup>	850	851	932	838	756	842	897
1998	848	848	934	840	752	845	900

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

a TOTAL columns are employment-based weighted averages.

b Includes overtime premiums.

c Many aerospace manufacturers have included lump-sum payments in labor settlements since late 1983 in lieu of general wage increases and/or cost of living adjustments. These payments are reported by BLS in separate wage series for SICs 3721 & 3761 and are included by AIA in totals.

r Revised.



**AVERAGE HOURS IN THE AEROSPACE INDUSTRY**

**Production Workers Only  
Calendar Years 1984–1998**

Year	TOTAL <sup>a</sup>	Aircraft (SIC 372)			Guided Missiles, Space Vehicles & Parts (SIC 376)	Complete Guided Missiles, & Space Vehicles (SIC 3761)	
		TOTAL <sup>a</sup>	Airframes (SIC 3721)	Engines & Parts (SIC 3724)			Other Parts & Equipment (SIC 3728)
<b>AVERAGE WEEKLY HOURS</b>							
1984	41.9	41.9	41.2	42.2	42.7	42.0	42.3
1985	42.3	42.3	41.5	42.2	43.4	42.4	42.6
1986	42.7	42.8	42.1	42.9	43.7	42.4	42.7
1987	42.4	42.4	42.1	42.5	42.8	42.5	42.5
1988	42.5	42.4	42.0	42.2	43.1	43.2	43.2
1989	42.1	41.9	41.4	42.7	42.3	43.0	43.0
1990	42.3	42.3	41.9	42.9	42.6	42.5	42.8
1991	41.8	41.7	41.5	42.5	41.5	42.4	42.7
1992	41.6	41.7	41.6	42.3	41.3	40.8	40.5
1993	41.6	41.6	41.0	42.8	41.8	41.4	41.7
1994	42.1	42.1	41.0	43.5	43.0	42.2	42.6
1995	42.1	42.0	40.5	44.4	42.5	43.1	43.7
1996	43.1	43.2	41.9	44.6	43.9	42.7	43.3
1997	44.6	44.7	44.2	45.1	45.1	43.1	43.2
1998	44.0	44.2	44.2	44.4	44.1	42.1	41.7

**AVERAGE WEEKLY OVERTIME HOURS**

1984	3.9	4.0	3.0	5.1	4.6	3.3	3.4
1985	4.6	4.6	3.5	5.4	5.3	4.6	5.0
1986	4.8	4.9	4.2	5.5	5.5	4.4	4.7
1987	4.8	4.9	4.4	5.0	5.4	4.2	4.3
1988	4.6	4.6	4.3	4.6	5.1	4.5	4.6
1989	5.0	5.1	5.0	5.4	5.0	4.4	4.5
1990	4.5	4.6	4.3	5.3	4.5	3.8	4.1
1991	4.0	4.0	4.1	4.5	3.5	3.9	4.5
1992	3.6	3.7	3.6	4.4	3.3	2.8	3.1
1993	3.8	3.9	3.7	4.6	3.7	2.9	3.2
1994	4.5	4.6	4.1	5.3	4.8	3.7	3.8
1995	4.8	4.9	4.2	5.9	5.2	4.2	4.6
1996	5.7	5.9	5.3	6.5	6.3	3.9	4.2
1997	6.9	7.2	7.2	6.8	7.3	4.3	4.3
1998	5.9	6.1	5.9	6.0	6.3	3.8	3.6

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly) and Aerospace Industries Association estimates.

<sup>a</sup> TOTAL columns are employment-based weighted averages.

## EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

Calendar Years 1979–1998

Year	Employment <sup>a</sup>			Cost Per R&D Scientist and Engineer <sup>d</sup>	
	All Industries <sup>b</sup> (Thousands)	Aerospace <sup>c</sup> (Thousands)	Aerospace as a Percent of All Industries	All Industries <sup>b</sup>	Aerospace <sup>c</sup>
1979	423.9	86.5	20.4%	\$ 87,400	\$ 93,300
1980	450.6	85.9	19.1	94,900	101,600
1981	487.8	95.2	19.5	103,900	128,400
1982	509.8	91.1	17.9	111,600	148,800
1983	540.9	103.1	19.1	116,000	143,600
1984	584.1	111.5	19.1	124,000	156,000
1985	622.5	130.2	20.9	130,200	161,700
1986	671.0	144.8	21.6	128,500	149,800
1987	695.8	136.3	19.6	128,800	180,400
1988	708.6	136.4	19.2	132,300	193,300
1989	722.5	134.8	18.7	134,500	207,300
1990	743.6	115.3	15.5	141,300	213,700
1991	773.4	100.2	13.0	148,600	177,000
1992	779.3	92.9	11.9	157,912	180,552
1993	764.7	97.9	12.8	153,336	176,450
1994	768.5	72.8	9.5	157,459 <sup>f</sup>	186,898 <sup>f</sup>
1995	746.1	63.5	8.5	167,339	213,328
1996	832.8	95.5	11.5	168,362	170,733
1997	885.7	94.6	10.7	171,495	189,972
1998	951.5	77.0	8.1	NA	NA

Source: National Science Foundation.

- a Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.
- b All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.
- c Standard Industrial Classification codes 372 and 376.
- d The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.
- NA Not available.
- r Revised.

**EMPLOYMENT IN NATIONAL AERONAUTICS  
AND SPACE ADMINISTRATION PROGRAMS**  
End of Fiscal Years 1961–2000

Year	TOTAL	NASA Employees	Contractor Employees <sup>a</sup>
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	128,730	22,430	106,300
1983	129,246	22,246	107,000
1984	162,080	22,080	140,000
1985	131,991	21,991	110,000
1986	154,660	21,660	133,000
1987	165,001	22,001	143,000
1988	172,326	22,326	150,000
1989	213,054	23,054	190,000
1990	221,829	23,829	198,000
1991	223,149	24,149	199,000
1992	230,513	24,513	206,000
1993	228,674	24,174	204,500
1994	217,910	23,873	194,037
1995	209,355	22,355	187,000
1996	198,113	21,113	177,000
1997	189,070	20,070	169,000
1998	183,109	19,109	164,000
1999 <sup>E</sup>	181,800	18,800	163,000
2000 <sup>E</sup>	177,200	18,200	159,000

Source: Office of Management and Budget, "Budget of the United States Government" (Annually) and NASA Headquarters.

a Includes estimates of manpower for hardware and related contracts, as well as actual work-years for support service contracts. Increase in FY 1984 caused by change in estimating methodology to reflect more accurately the mix of support and development contractors.

E Estimate.

**FEDERAL CIVILIAN EMPLOYMENT<sup>a</sup>  
IN THE DEPARTMENT OF DEFENSE**  
Fiscal Years 1967–2000

Year	TOTAL	Civil Functions <sup>b</sup>	Military Functions <sup>c</sup>
1967	1,225,637	31,980	1,193,657
1968	1,288,130	32,062	1,256,068
1969	1,257,091	31,214	1,225,877
1970	1,159,935	30,293	1,129,642
1971	1,092,804	30,063	1,062,741
1972	1,040,147	30,585	1,009,562
1973	987,281	29,971	957,310
1974	1,002,850	29,072	973,778
1975	983,790	29,069	954,721
1976	951,034	28,648	922,386
1977	940,549	28,912	911,637
1978	933,071	28,962	904,109
1979	914,582	28,592	885,990
1980	907,700	27,700	880,000
1981	981,400	34,400	947,000
1982	1,009,192	31,111	978,081
1983	1,015,622	30,816	984,806
1984	1,040,213	28,681	1,011,532
1985	1,065,624	28,754	1,036,870
1986	1,069,863	28,511	1,041,352
1987	1,059,669	28,352	1,031,317
1988	1,053,000	28,419	1,024,581
1989	1,051,166	28,081	1,023,085
1990	1,048,814	27,651	1,021,163
1991	1,001,183	27,385	973,798
1992	1,000,453	27,584	972,869
1993	958,855	27,055	931,800
1994	896,293	28,001	868,292
1995	849,529	27,790	821,739
1996	806,122	27,180	778,942
1997	771,914	26,164	745,750
1998	732,089	24,855	707,234
1999 <sup>E</sup>	711,800	25,300	686,500
2000 <sup>E</sup>	687,700	24,800	662,900

Source: Office of Management and Budget, "The Budget of the United States Government" (Annually).

a Full-time equivalent civilian employment.

b Data are estimated for portions of Civil Functions.

c The Department of Defense is exempt from full-time equivalent controls. Data shown are estimated civilian employment for military functions and military assistance.

E Estimate.

**OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES<sup>a</sup>**  
**ALL MANUFACTURING AND AEROSPACE INDUSTRIES**  
**Calendar Years 1993–1997**

	1993	1994	1995	1996	1997
<b>All Manufacturing:</b>					
Total Cases .....	12.1	12.2	11.6	10.6	10.3
Lost Workday Cases .....	5.3	5.5	5.3	4.9	4.8
Nonfatal Cases without Lost Workdays	6.8	6.8	6.3	5.7	5.4
<b>Aircraft and Parts (SIC 372):</b>					
Total Cases .....	10.3	9.7	8.8	7.9	8.7
Lost Workday Cases .....	4.1	4.0	3.6	3.4	3.8
Nonfatal Cases without Lost Workdays	6.2	5.7	5.3	4.5	4.9
<b>Aircraft (SIC 3721):</b>					
Total Cases .....	10.2	9.4	8.7	7.3	8.5
Lost Workday Cases .....	4.0	3.8	3.4	3.0	3.7
Nonfatal Cases without Lost Workdays	6.2	5.7	5.3	4.3	4.8
<b>Aircraft Engines and Parts (SIC 3724):</b>					
Total Cases .....	9.7	10.0	8.3	7.9	7.7
Lost Workday Cases .....	4.1	3.8	3.4	3.6	3.3
Nonfatal Cases without Lost Workdays	5.6	6.2	4.9	4.3	4.5
<b>Aircraft Parts (SIC 3728):</b>					
Total Cases .....	11.1	10.0	9.5	9.1	9.9
Lost Workday Cases .....	4.3	4.6	4.1	3.9	4.5
Nonfatal Cases without Lost Workdays	6.7	5.5	5.4	5.2	5.4
<b>Guided Missiles, Space Vehicles &amp; Parts (SIC 376):</b>					
Total Cases .....	4.5	4.5	4.0	3.4	3.2
Lost Workday Cases .....	1.9	1.8	1.8	1.3	1.5
Nonfatal Cases without Lost Workdays	2.6	2.7	2.2	2.0	1.7
<b>Guided Missiles &amp; Space Vehicles (SIC 3761):</b>					
Total Cases .....	4.6	4.2	3.7	3.0	2.9
Lost Workday Cases .....	1.9	1.6	1.5	1.2	1.3
Nonfatal Cases without Lost Workdays	2.7	2.6	2.1	1.8	1.6
<b>Space Propulsion Units &amp; Parts (SIC 3764):</b>					
Total Cases .....	NA	4.3	NA	NA	NA
Lost Workday Cases .....	NA	1.7	NA	NA	NA
Nonfatal Cases without Lost Workdays	NA	2.5	NA	NA	NA
<b>Other Space Vehicle Equipment (SIC 3769):</b>					
Total Cases .....	4.8	6.5	5.8	NA	NA
Lost Workday Cases .....	1.8	2.8	3.0	NA	NA
Nonfatal Cases without Lost Workdays	3.0	3.7	2.8	NA	NA

Source: Bureau of Labor Statistics, "Survey of Occupational Injuries and Illnesses" (Annually).

<sup>a</sup> Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

NA Not available.

**AEROSPACE INDUSTRY WORK STOPPAGES<sup>a</sup>**  
**Calendar Years 1979–1998**

Year	Number of Strikes <sup>b</sup>	Number of Workers Involved	Work-Days Idle in Year
1979	12	6,600	103,400
1980	17	4,400	92,900
1981	12	6,100	188,900
1982 <sup>c</sup>	4	11,900	45,200
1983	2	8,700	404,100
1984	4	14,600	188,200
1985	4	19,700	289,800
1986	—	—	—
1987	—	—	—
1988	3	10,600	415,800
1989	2	58,500	1,848,000
1990	1	2,300	56,700
1991	1	1,500	—
1992	1	3,800	11,400
1993	2	27,800	34,600
1994	—	—	—
1995	1	33,000	1,551,000
1996	2	7,800	90,100
1997	—	—	—
1998	—	—	—

Source: Bureau of Labor Statistics, "Compensation and Working Conditions" (Monthly).

a Based on SIC 372 of the 1967 Code, which includes missile and space propulsion units and parts and missile and space vehicle equipment not elsewhere classified, but which excludes complete guided missiles and space vehicles.

b Strikes beginning during calendar year.

c Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.

# FINANCE


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In 1998 the aerospace industry reported net profits in excess of \$7 billion for the third year in a row. Expressed as a percentage of sales, the industry's profit amounted to 5.0%. This was lower than the 6.1% average for all U.S. manufacturing industries. It also marked a drop from the 1997 aerospace profit-to-sales ratio of 5.2%. As a percentage of assets, the 1998 aerospace figure was 4.8%, same as in the previous year. As a percentage of equity, aerospace earnings were 18.0%, up from 17.3% in 1997.

The aerospace balance sheet for 1998 showed net working capital of \$11.5 billion, down sharply from \$14.2 billion in 1997. Stockholders' equity increased 10% from \$39.3 billion in 1997 to \$40.1 billion in 1998, while total assets climbed from \$150 billion to \$160 billion.

Lockheed Martin Corporation topped the list of DoD's prime contractors in terms of FY 1998 contract award value with contracts totaling \$12.3 billion. In second place was The Boeing Company with \$10.9 billion. The Raytheon Company, at \$5.7 billion, captured third. Rounding out the top 10 were General Dynamics Corporation (\$3.7 billion), Northrop Grumman Corporation (\$2.7 billion), United Technologies Corporation (\$2.0 billion), Textron Inc. (\$1.8 billion), Litton Industries Inc. (\$1.6 billion), Newport News Shipbuilding Inc. (\$1.5 billion), and TRW Inc. (\$1.3 billion).

Geographically, the South Atlantic region remained in first place on the list of DoD prime contract awards for aircraft production, staying ahead of both the West North Central and the Pacific regions. The South Atlantic region received contracts valued at \$5.5 billion, or 24.0% of the total. The Pacific region was second with \$4.5 billion (19.8%), and the West North Central region was third with \$4.3 billion (18.9%).

An aerial photograph of a city, likely New York City, with a large commercial airplane in the foreground, partially obscuring the view of the city buildings. The image is in black and white and serves as a background for the top half of the page.

In DoD missile/space contract awards, the Pacific region remained far out in front with \$4.5 billion (40.3%). In second place was the Mountain region with \$2.0 billion (18.1%); and in third was the South Atlantic region with \$1.4 billion (12.3%).

The South Atlantic region also led in DoD awards for electronics and communications equipment with \$4.2 billion (32.8%); the Pacific region was second with \$2.6 billion (20.3%); and the Middle Atlantic was third with \$1.9 billion (14.7%).

The Boeing Company led the list of NASA contractors with contracts in FY 1998 valued at \$1.5 billion. The rest of the top 10 included United Space Alliance, a Boeing/Lockheed Martin partnership (\$1.5 billion), Lockheed Martin Corporation (\$1 billion), McDonnell Douglas Corporation (\$420 million), Thiokol Corporation (\$364 million), AlliedSignal Technical Services (\$275 million), Boeing North America (\$261 million), Lockheed Martin Engineering and Science (\$227 million), TRW Inc. (\$224 million), and Computer Sciences Corporation (\$177 million).



## INCOME STATEMENT AND OPERATING RATIOS FOR AEROSPACE COMPANIES<sup>a</sup>

Calendar Years 1995–1998  
(Millions of Dollars)

INCOME STATEMENT	1995	1996	1997	1998
Net Sales, Receipts, Operating Revenues .....	\$ 122,993	\$ 127,051	\$ 139,287	\$ 154,606
Less: Depreciation, Depletion, & Amortization of Property, Plant, and Equipment .....	4,106	4,134	4,011	4,201
Less: All Other Operating Costs & Expenses, Including Selling Costs & General & Administrative Expenses .....	112,930	112,792	125,712	139,118
<b>Income (or Loss) from Operations .....</b>	<b>\$ 5,957</b>	<b>\$ 10,125</b>	<b>\$ 9,564</b>	<b>\$ 11,287</b>
Net Non-Operating Income (Expense) .....	308	8	400	(431)
<b>Income (or Loss) before Income Taxes (= Total Income) .....</b>	<b>\$ 6,264</b>	<b>\$ 10,132</b>	<b>\$ 9,964</b>	<b>\$ 10,855</b>
Less: Provision for Current & Deferred Domestic Income Taxes .....	1,631	2,982	2,743	3,155
<b>Income (or Loss) after Income Taxes (= Net Profit) .....</b>	<b>\$ 4,633</b>	<b>\$ 7,150</b>	<b>\$ 7,221</b>	<b>\$ 7,701</b>
Cash Dividends Charged to Retained Earnings .....	1,985	2,071	2,707	2,397
<b>Net Income Retained in Business .....</b>	<b>\$ 2,649</b>	<b>\$ 5,078</b>	<b>\$ 4,512</b>	<b>\$ 5,304</b>
Retained Earnings at Beginning of Year <sup>b</sup> .....	29,873	30,225	29,973	31,130
Adjustments to Retained Earnings <sup>c</sup> .....	89	(1,189)	(3,330)	(42)
<b>Retained Earnings at End of Year<sup>d</sup> .....</b>	<b>\$ 32,610</b>	<b>\$ 34,115</b>	<b>\$ 31,157</b>	<b>\$ 36,392</b>

### OPERATING RATIOS

Income before Taxes as Percent of Net Sales .....	5.1%	8.0%	7.2%	7.0%
Provision for Current & Deferred Domestic Income Taxes as Percent of Income before Taxes (Total Income) .....	26.0	29.4	27.5	29.1
Income after Taxes (Net Profit) as Percent of Net Sales .....	3.8	5.6	5.2	5.0
Income after Taxes (Net Profit) as Percent of Stockholders' Equity <sup>e</sup> .....	11.1	17.1	17.3	18.0
Income after Taxes (Net Profit) as Percent of Total Assets <sup>e</sup> .....	3.5	5.1	4.8	4.8

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).

NOTE: Detail may not add to totals because of rounding.

- a Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and their propulsion, and parts.
- b Beginning-of-year retained earnings for any particular year do not equal end-of-year retained earnings for the previous year because of rotation of small companies in survey sample.
- c Other direct credits (or charges) to retained earnings (net), including stock and other non-cash dividends, etc.
- d Retained Earnings at End of Year CALCULATED AS Retained Earnings at Beginning of Year PLUS Income (Loss) after Income Taxes MINUS Cash Dividends Charged to Retained Earnings PLUS Adjustments to Retained Earnings.
- e Average of four quarters.

BALANCE SHEET FOR AEROSPACE COMPANIES<sup>a</sup>

December 31, 1995-1998

(Millions of Dollars)

	1995	1996	1997	1998
<b>Assets:</b>				
Current Assets:				
Cash .....	\$ 2,540	\$ 4,051	\$ 3,017	\$ 1,918
Securities, Commercial Paper, & Other Short-term Financial Investments .....	5,271	5,025	4,466	2,364
Total Cash and U.S. Government and Other Securities .....	\$ 7,811	\$ 9,076	\$ 7,484	\$ 4,283
Receivables (Total) .....	17,303	18,130	18,970	16,765
Inventories (Gross) .....	38,590	30,873	43,411	46,578
Other Current Assets .....	5,053	5,531	7,312	7,730
<b>Total Current Assets</b> .....	<b>\$ 68,757</b>	<b>\$ 63,611</b>	<b>\$ 77,176</b>	<b>\$ 75,356</b>
Net Plant, Property, & Equipment .....	26,285	24,272	24,819	26,721
Other Non-Current Assets .....	37,275	48,054	48,243	57,779
<b>Total Assets</b> .....	<b>\$132,318</b>	<b>\$135,937</b>	<b>\$150,238</b>	<b>\$159,856</b>
<b>Liabilities:</b>				
Current Liabilities:				
Short Term Loans .....	\$ 1,561	\$ 1,951	\$ 1,866	\$ 4,178
Trade Accounts & Notes Payable .....	11,592	10,688	11,330	11,634
Income Taxes Accrued .....	1,479	2,410	2,160	2,429
Installments Due on Long Term Debts ...	2,014	918	2,567	2,098
Other Current Liabilities .....	33,318	31,683	45,094	43,524
<b>Total Current Liabilities</b> .....	<b>\$ 49,965</b>	<b>\$ 47,650</b>	<b>\$ 63,019</b>	<b>\$ 63,862</b>
Long Term Debt .....	19,155	28,091	26,545	28,937
Other Non-Current Liabilities .....	20,770	20,370	21,349	23,987
<b>Total Liabilities</b> .....	<b>\$ 89,889</b>	<b>\$ 96,110</b>	<b>\$110,914</b>	<b>\$116,787</b>
<b>Stockholders' Equity:</b>				
Capital Stock .....	\$ 9,804	\$ 10,004	\$ 9,438	\$ 8,027
Retained Earnings .....	32,624	29,824	29,886	35,043
<b>Total Stockholders' Equity</b> .....	<b>\$ 42,428</b>	<b>\$ 39,828</b>	<b>\$ 39,324</b>	<b>\$ 43,069</b>
<b>Total Liabilities &amp; Stockholders' Equity</b> .....	<b>\$132,318</b>	<b>\$135,937</b>	<b>\$150,238</b>	<b>\$159,856</b>
<b>Net Working Capital</b> .....	<b>\$ 18,793</b>	<b>\$ 15,961</b>	<b>\$ 14,157</b>	<b>\$ 11,494</b>

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).

NOTE: Detail may not add to totals because of rounding.

a Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, their propulsion, and parts.

**NET PROFIT AFTER TAXES  
AS A PERCENT OF SALES, ASSETS, AND EQUITY  
FOR ALL MANUFACTURING CORPORATIONS  
AND THE AEROSPACE INDUSTRY**

Calendar Years 1984–1998

**PERCENT OF SALES**

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace <sup>a</sup> Industry
1984	4.6%	4.8%	4.4%	4.1%
1985	3.8	4.1	3.4	3.1
1986	3.7	4.6	2.9	2.8
1987	4.9	5.2	4.5	4.1
1988	6.0	6.7	5.2	4.3
1989	5.0	5.8	4.1	3.3
1990	4.0	4.9	3.0	3.4
1991	2.5	4.2	0.6	1.8 <sup>b</sup>
1992	1.0	3.2	(1.4)	(1.4) <sup>b</sup>
1993	2.8	3.7	1.9	3.6
1994	5.4	5.5	5.2	4.7
1995	5.7	6.1	5.3	3.8
1996	6.0	6.6	5.5	5.6
1997	6.2	6.6	5.8	5.2
1998	6.0	6.1	5.9	5.0

Year	Percent of Assets <sup>c</sup>		Percent of Equity <sup>c</sup>	
	All Manufacturing	Aerospace <sup>a</sup> Industry	All Manufacturing	Aerospace <sup>a</sup> Industry
1984	6.0%	4.7%	12.5%	14.1%
1985	4.6	3.6	10.1	11.1
1986	4.2	3.1	9.5	9.4
1987	5.6	4.4	12.8	14.6
1988	6.9	4.4	16.2	14.9
1989	5.6	3.3	13.7	10.7
1990	4.3	3.4	10.7	11.5
1991	2.6	1.9 <sup>b</sup>	6.4	6.1 <sup>b</sup>
1992	1.0	(1.2) <sup>b</sup>	2.6	(5.2) <sup>b</sup>
1993	2.9	3.5	8.1	13.2
1994	5.8	4.3	15.6	14.8
1995	6.2	3.5	16.2	11.1
1996	6.5	5.1	16.8	17.1
1997	6.6	4.8	16.6	17.3
1998	6.1	4.8	15.7	18.0

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations" (Quarterly).

a Based on a sample of corporate entities classified in SIC codes 372 and 373, and 374, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, their propulsion, and parts.

b Reflects unusually large non-operating expenses totalling \$3.4 and \$8.7 billion in 1991 and 1992, respectively, due to restructuring changes and the implementation of a change in accounting for future retirement benefit costs.

c Average of four quarters

(-) Net loss after taxes.

## NEW CAPITAL EQUIPMENT EXPENDITURES

Calendar Years 1967-1996

(Millions of Dollars)

Year	All Manufacturing Industries	Aerospace Industry <sup>a</sup>	Aircraft, Engines, & Parts	Missiles, Space Vehicles, & Parts
1967	\$ 21,503	\$ 520	\$ 408	\$ 111
1968	20,613	399	282	117
1969	22,291	429	340	89
1970	22,164	244	181	62
1971	20,941	115	59	56
1972	24,073	261	169	92
1973	26,979	362	258	104
1974	35,696	407	283	124
1975	37,262	478	369	109
1976	40,545	557	431	126
1977	47,459	673	508	164
1978	55,209	948	775	174
1979	61,533	1,551	1,301	250
1980	70,113	1,923	1,618	306
1981	78,632	2,006	1,637	369
1982	74,562	2,142	1,680	462
1983	61,931	2,159	1,530	629
1984	75,186	3,050	2,091	960
1985	83,058	3,784	2,429	1,356
1986	76,355	4,145	2,818	1,327
1987	78,650	3,612	2,536	1,075
1988	81,593	3,388	2,362	1,026
1989	98,738	3,921	2,800	1,121
1990	105,018	3,490	2,621	869
1991	103,003	3,407	2,823	584
1992	103,188	3,860	3,384	476
1993	103,133	2,725	2,307	418
1994	112,784	2,363	1,969	395
1995	128,473	2,114	1,734	380
1996	139,323	2,513	2,023	490

Source: Bureau of the Census, "Statistics for Industry Groups and Industries" Series M96(A5)-1 (Annually) and "Aerospace Equipment, Including Parts" Series MC92-I-37B.

NOTE: Data for 1997 delayed by Bureau's Economic Census. Call 202-371-8563 for latest data.

a Combined total for establishments in SICs 372 or 376.

**DEPARTMENT OF DEFENSE  
PRIME CONTRACT AWARDS OVER \$25,000  
FOR SELECTED MAJOR MILITARY HARD GOODS**

By Geographic Region  
Fiscal Years 1996, 1997, and 1998

Program and Region	Millions of Dollars			Percent of Program Total		
	1996	1997	1998	1996	1997	1998
<b>AIRCRAFT—TOTAL</b> .....	\$25,943	\$21,066	\$22,690	100.0%	100.0%	100.0%
New England .....	\$ 1,557	\$ 1,749	\$ 1,493	6.0%	8.3%	6.6%
Middle Atlantic .....	1,497	1,272	1,348	5.8	6.0	5.9
East North Central .....	1,306	1,376	1,441	5.0	6.5	6.4
West North Central .....	6,419	4,093	4,298	24.7	19.4	18.9
South Atlantic .....	4,802	5,085	5,455	18.5	24.1	24.0
East South Central .....	274	380	417	1.1	1.8	1.8
West South Central .....	3,922	2,529	2,658	15.1	12.0	11.7
Mountain.....	1,131	432	1,084	4.4	2.1	4.8
Pacific <sup>a</sup> .....	5,036	4,150	4,496	19.4	19.7	19.8
<b>MISSILE &amp; SPACE SYSTEMS—TOTAL</b> .....	\$11,554	\$11,180	\$11,152	100.0%	100.0%	100.0%
New England .....	\$ 1,283	\$ 1,066	\$ 838	11.1%	9.5%	7.5%
Middle Atlantic .....	577	802	368	5.0	7.2	3.3
East North Central .....	106	82	147	0.9	0.7	1.3
West North Central .....	346	243	306	3.0	2.2	2.7
South Atlantic .....	1,460	1,382	1,373	12.6	12.4	12.3
East South Central .....	648	665	626	5.6	5.9	5.6
West South Central .....	1,114	989	983	9.6	8.8	8.8
Mountain.....	2,079	1,479	2,014	18.0	13.2	18.1
Pacific <sup>a</sup> .....	3,940	4,471	4,498	34.1	40.0	40.3
<b>ELECTRONICS &amp; COMMUNICATIONS EQUIPMENT—TOTAL</b> ...	\$13,499	\$14,024 <sup>r</sup>	\$12,813	100.0%	100.0%	100.0%
New England .....	\$ 1,274	\$ 1,194	\$ 1,163	9.4%	8.5%	9.1%
Middle Atlantic .....	1,769	1,983	1,880	13.1	14.1	14.7
East North Central .....	844	960	841	6.3	6.8	6.6
West North Central .....	464	401	534	3.4	2.9	4.2
South Atlantic .....	4,577	5,083	4,198	33.9	36.2	32.8
East South Central .....	252	162	204	1.9	1.2	1.6
West South Central .....	799	744	774	5.9	5.3	6.0
Mountain.....	606	631	617	4.5	4.5	4.8
Pacific <sup>a</sup> .....	2,914	2,865	2,602	21.6	20.4	20.3

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).

NOTE: Detail may not add to totals because of rounding.

a Includes Alaska and Hawaii.

r Revised.

## DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1994-1998

Listed by rank according to net value of  
prime contracts awarded during last fiscal year  
(Millions of Dollars)

Company	1994	1995	1996	1997	1998
<b>TOTAL CONTRACTS</b> .....	\$ 118,114	\$ 117,552	\$ 119,556	\$ 116,680	\$ 118,139
Lockheed Martin Corp. <sup>b</sup> .....	\$ 11,333	\$ 12,450	\$ 11,998	\$ 11,638	\$ 12,341
The Boeing Co. <sup>c</sup> .....	11,523	11,011	12,951	9,645	10,866
Raytheon Co. <sup>d</sup> .....	6,548	5,883	6,252	5,693	5,661
General Dynamics Corp. <sup>e</sup> .....	3,599	2,258	2,670	3,012	3,680
Northrop Grumman Corp. <sup>f</sup> .....	5,202	2,913	2,605	3,476	2,691
United Technologies Corp. ....	2,677	1,775	2,258	1,810	1,983
Textron Inc. ....	1,236	1,069	1,194	1,445	1,838
Litton Industries Inc. ....	1,576	1,237	1,709	1,603	1,644
Newport News Shipbuilding Inc.	(a)	3,710	(a)	720	1,546
TRW Inc. <sup>g</sup> .....	1,376	1,254	1,194	1,163	1,346
Carlyle Group <sup>h</sup> .....	582	486	877	611	1,329
Science Applications Int'l Corp.	868	931	1,065	1,095	1,224
General Electric Co. ....	2,705	2,104	1,530	1,677	1,161
Humana Inc. ....	(a)	(a)	188	621	868
GTE Corp. ....	788	633	599	890	787
ITT Industries Inc. ....	609	648	671	790	781
General Electric Co. PLC .....	176	124	194	247	732
AlliedSignal Inc. ....	453	503	512	547	655
Computer Sciences Corp. ....	589	656	712	704	647
Foundation Health Systems Inc.	351	(a)	(a)	656	593
Westinghouse Electric Corp. ...	1,357	1,225	1,441	777 <sup>i</sup>	567 <sup>i</sup>
Dyncorp .....	489	448	380	535	537
Standard Missile Co. ....	(a)	(a)	372	472	475
IT Group Inc. ....	171	219	145	(a)	436
Rockwell International Inc. ....	(a)	(a)	(a)	454	435
Triwest Healthcare Alliance Co.	(a)	(a)	(a)	213	420
Avondale Industries Inc. ....	902	(a)	328	622	399
Mitre Corp. ....	425	370	375	304	394
MIT .....	318	344	319	368	372
Texas Instruments Inc. ....	690	554	529	529	349

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards" (Annually).

a Not in top 100 companies for indicated year(s).

b Includes awards previously reported separately as Martin Marietta Corp., Lockheed Corp., and Loral Corp.

c Includes awards previously reported separately as McDonnell Douglas Corp. and Rockwell International Corp.

d Includes awards previously reported as E-Systems Inc. and General Motors Corp.

e Includes awards previously reported as Bath Holding Corp.

f Includes awards previously reported as Grumman Corporation.

g Includes awards previously reported separately as BDM International Inc.

h Listed previously as United Defense Limited Partnership and FMC Corp.

i Listed as CBS Corp.

## NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1995–1998  
By rank according to net value of NASA prime  
contracts awarded during last fiscal year  
(Millions of Dollars)

Company	1995	1996	1997	1998
<b>TOTAL PROCUREMENTS</b> .....	\$13,341	\$12,699	\$12,790	\$12,561
<b>Awards to Business Firms</b> .....	10,311	9,801	9,817	9,551
% of TOTAL PROCUREMENTS .....	77 %	77%	77%	76%
The Boeing Co. ....	\$ 1,442	\$ 1,608	\$ 1,662	\$ 1,488
United Space Alliance LLC <sup>b</sup> .....	864	870	1,314	1,480
Lockheed Martin Corp. <sup>c</sup> .....	830	833	1,049	982
McDonnell Douglas Corp. ....	468	389	354	420
Thiokol Corp. ....	440	396	424	364
AlliedSignal Technical Services .....	231	285	333	275
Boeing North America <sup>d</sup> .....	1,022	756	237	261
Lockheed Martin Engr. & Science ...	164	166	376	227
TRW Inc.....	288	287	281	224
Computer Sciences Corp. ....	311	214	163	177
EG&G Florida Inc. ....	183	175	156	150
Hughes Aircraft Co. ....	44	153	153	108
Lockheed Martin Aerospace Corp. <sup>f</sup> ...	164	161	72	94
Hughes Information Tech. Corp.....	87	133	117	92
United Technologies Corp. ....	159	162	140	91
Boeing Commercial Airplane Group	89	83	90	86
Science Applications Int'l Corp. ....	43	30	58	78
Ball Aerospace & Tech. Corp. ....	47	47	52	69
Johnson Controls World Serv. Inc. ...	65	69	62	63
General Electric Co. ....	51	58	69	62
USBI Booster Production Co. ....	172	157	147	61
Orbital Sciences Corp. ....	23	56	19	57
ITT Corp.....	18	25	35	57
Hamilton Standard Space Systems ...	(a)	(a)	9	55
Johnson Engineering Corp. ....	22	28	36	54
Hughes STX Corp. ....	48	47	43	52
Hughes Training Inc.....	(a)	44	43	45
Wyle Laboratories .....	9	7	8	42
Cortez III Service Corp.....	38	46	44	41
Grumman Aerospace Corp. ....	66	58	47	41

Source: National Aeronautics and Space Administration, "Annual Procurement Report" (Annually).

a Not in list of major contractors for indicated years.

b Includes awards previously reported separately as Lockheed Space Operations Co and Rockwell Space Operations Inc.

c Includes awards previously reported separately as General Electric Co., Martin Marietta Corp., and Lockheed Missiles & Space Co.

d Previously reported as Rockwell International Corp.

f Includes awards previously reported as Loral Aerospace Corp.

# GLOSSARY

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**Aeronautics:** the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

**Aerospace Employment:** annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft, missile, and space industries (SICs 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662), instruments (SICs 381 and 382), and in certain other industries (SICs 28, 35, 73, 89, etc.)

**Aerospace Industry:** the industry engaged in research, development, and manufacture of aerospace systems including: manned and unmanned aircraft; missiles; spacecraft; space launch vehicles; propulsion, guidance, and control units for all of the foregoing; and a variety of airborne and ground-based equipment essential to the test, operation, and maintenance of flight vehicles.

**Aerospace Payroll:** estimated on the basis of average weekly *earnings* for a given calendar year for *production workers* plus an estimated annual salary for other employees.

**Aerospace Sales:** the AIA estimate of aerospace industry sales, developed by summing: DoD expenditures for aircraft, missiles, and space-related *procurement* and *RDT&E*; NASA expenditures for *research and development* and space flight control and data communications; *outlays* for space activities by other U.S. government departments and agencies; commercial sales of space-related products; net domestic and export

sales of civil aircraft, engines, and parts; *Foreign Military Sales* and commercial exports of military aircraft, missiles, propulsion, and related parts; sales of *related products and services* including: electronics, software, and ground support equipment; and sales of *non-aerospace products* which are produced in aerospace-manufacturing *establishments* and which use technology, processes, and materials derived from the *aerospace industry*.

**AIA:** Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

**Air Carriers:** the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

**Aircraft:** all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane--any winged aircraft including helicopters, but excluding gliders and guided missiles.

**Aircraft Agreement (Agreement on Trade in Civil Aircraft):** negotiated the Tokyo Round of the *Multilateral Trade Negotiations* and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

**Aircraft Industry:** the industry primarily engaged in the manufacture of aircraft, aircraft engines, and parts including propellers and auxiliary equipment. A sector of the *Aerospace Industry*.



**Airframe:** the structural components of an airplane, such as: fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as: engines, accessories, electronics, and other parts that may be replaced from time to time.

**Airlines:** see *Air Carriers*.

**Appropriation (Federal Budget):** an act of Congress authorizing an agency to incur *obligations* and make payments out of funds held by the Department of the Treasury.

**Assets, Net:** the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, *depreciation*, and amortization, but before deducting any liabilities, mortgages, or other indebtedness.

**Astronautics:** the art and science of designing, building, and operating manned or unmanned space objects.

**Average Weekly Hours:** average hours for which pay was received; different from standard or scheduled hours.

**Avionics:** communications, navigation, flight controls, and displays.

**Backlog:** the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

**Budget Authority:** authority provided by the Congress; mainly in the form of *Appropriations*, which allows Federal agencies to incur *obligations* to spend or lend money.

**Bureau of Economic Analysis (BEA):** an agency of the Department of Commerce.

**Bureau of Labor Statistics (BLS):** an agency of the Department of Labor.

**Bureau of the Census:** an agency of the Department of Commerce.

**Constant Dollars:** calculated by dividing current ("then-year") dollars by appropriate price *deflator* and multiplying the result by 100.

**Deflator:** index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year.

**Depreciation:** the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

**Development:** the process or activity of working out a basic design, idea, or piece of equipment. See also *Research and Development*.

**DoD:** Department of Defense.

**DoE:** Department of Energy.

**DoT:** Department of Transportation.

**Durable Goods Industry:** comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered non-durable goods manufacturing industry groups.

**Earnings:** the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

**Average Hourly Earnings:** on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as: premium pay for overtime, late shift work, and changes in output of workers paid for an incentive plan.

**Average Weekly Earnings:** derived by multiplying *average weekly hours* by *average hourly earnings*.

**Establishment:** the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

**Evaluation (Department of Defense):** determination of technical suitability of material, equipment, or a system. See *RDT&E*.

**Expenditures (Federal Budget):** see *Outlays*.

**Export-Import Bank of the United States (Eximbank):** created in 1934 and established as an independent U.S. government agency in 1945, Eximbank is designed "... to aid in financing and to facilitate *exports*..." Eximbank receives no *appropriations* from the U.S. Congress. It is directed by statute to: (1) offer financing that is competitive with that offered exporters of other countries by their official export credit institutions, (2) determine that the transactions supported provide for a reasonable assurance of repayment, (3) supplement, but not compete with private sources of export financing, and (4) take into account the effect of its activities on small business, the domestic economy, and U.S. employment.

**Exports:** domestic merchandise including commodities which are grown, produced, or manufactured in the United States and commodities of foreign origin which have been

changed in the United States from the form in which they were imported or which have been enhanced in value by further manufacture in the United States and which are traded or sold to other nations.

**FAA:** Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

**Facility:** a physical plant or installation including: real property, building, structures, improvements, and plant equipment.

**Fiscal Year (Federal Budget):** beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end.

**Flyaway Value:** includes the cost of the airframe, engines, electronics, communications, armament, and other installed equipment.

**Foreign Military Sales (FMS):** export sales to foreign governments arranged through the Department of Defense, whereby DoD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

**FY:** see *Fiscal Year*.

**GDP (Gross Domestic Product):** the market value of goods and services produced by labor and property located in the United States.

**General Agreement on Tariffs and Trade (GATT):** a multilateral treaty among over 100 governments whose primary mission is the reduction of trade barriers. A World Trade Organization was established January 1, 1995 to implement the agreement and provide a forum to discuss trade issues.

**General Aviation:** all civil flying except that of *air carriers*.

**Helicopter:** a rotary-wing *aircraft* which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a *V/STOL*.

**Heliport:** an area, either at ground level or elevated on a structure, that is used for the landing and take-off of helicopters and includes some or all of the various facilities useful to helicopter operations such as: helicopter parking, hangar, waiting room, fueling, and maintenance equipment.

**Helistop:** a minimum facility *heliport*, either at ground level or elevated on a structure for the landing and takeoff of helicopters, but without such auxiliary facilities as: waiting room, hangar, parking, etc.

**ICBM:** InterContinental Ballistic Missile, with a range of more than 5,000 miles.

**Imports:** classified as "general imports" or "imports for consumption". This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight, and other charges incidental to arrival of the goods in the United

States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

#### **Income:**

**Net Operating Income:** total *sales* less total operating costs.

**Other Income and Expenses:** includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.

**Net Income (Before Income Taxes):** *Net Operating Income* plus or minus *Other Income and Expenses*.

**Net Income (After Income Taxes):** *Net Income (Before Income Taxes)* less federal income taxes.

**Lump-Sum Wage Payment:** a one-time payment given in lieu of general wage increases and/or cost of living adjustments in labor settlements.

**Manufacturing Industries:** those *establishments* engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling equipment; also *establishments* engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

**Merchandise Trade Balance:** the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when *exports* exceed *imports*—a trade surplus—and "unfavorable" when *imports* exceed *exports*—a trade deficit.

SI 000000

**Missile:** sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, i.e., a weapon which has an integral system of guidance, as opposed to the unguided rocket.

**Multilateral Trade Negotiations**

**(MTN):** a forum within the *GATT* in which countries negotiate to overcome their trade problems.

Awaiting ratification by each of the 112 nations involved in the MTN, the "Uruguay Round" seeks to strengthen the *GATT* and expand its disciplines to new areas such as: services, agriculture, and trade-related intellectual property rights.

**NASA:** National Aeronautics and Space Administration.

**NATO:** North Atlantic Treaty Organization.

**New Obligational Authority (Federal Budget):** see *Budget Authority*.

**Non-Aerospace Products and Services:** products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by *establishments* whose principal business is the development and/or manufacture of aerospace products.

**OASD:** Office of the Assistant Secretary of Defense.

**Obligations (Federal Budget):** commitments made by Federal agencies to pay out money for products, services, or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than *budget authority*.

**Orders, Net New:** the sales value of new orders (supported by legal documents) minus cancellations during the period.

**Other Aerospace Products and Services:** all conversions, modifications, site activation, other aerospace products (including drones), services, plus *research and development* under contract, defined as: basic and applied research in the sciences and in engineering and design and development of prototype products and processes.

**Other Customers:** all customers other than the U.S. government to include but not limited to: *air carriers*, private citizens and corporations, and state, local, and foreign governments.

**Outlays:** checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

**Overtime Hours:** that portion of the gross *average weekly hours* which was in excess of regular hours and for which premium payments were made.

**Passenger-Mile:** one passenger moved one mile.

**Payroll, All Manufacturing:** includes the gross *earnings* paid in the calendar year to all employees on the payroll of operating manufacturing *establishments*. Includes all forms of compensation paid directly to workers such as: salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind; prior to such deductions as: employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non-payroll labor costs such as: employees' pension plans, group insurance premiums, and workmen's compensation.

**Procurement:** the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

**Production Workers:** includes working foremen and all non-supervisory workers (including lead-men and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use, and recordkeeping and services closely associated with the above production operations.

**RDT&E (Department of Defense):** Research, Development, Test, and Evaluation.

**Related Products and Services:** sales of electronics, software, and ground equipment in support of aerospace products, plus sales by aerospace manufacturing *establishments* of systems and equipment which are generally derived from the industry's aerospace technological expertise in design, materials, and processes, but which are intended for applications other than flight.

**Research:** see *Research and Development*.

**Research and Development:**

**Research:** systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either basic or applied according to the objectives of the sponsoring agency.

**Applied Research:** with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

**Basic Research:** with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

**Development:** the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototypes and processes.

**Independent Research and Development (IR&D):** a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

**Industrial Research and Development:** research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as: research institutions, universities and colleges, or other non-profit organizations.

**Rotorcraft:** an *aircraft* which, in all its usual flight attitudes, is supported in the air wholly or in part by a rotor or rotors (i.e. airfoils rotating or revolving about an axis). See *Helicopter*.

**Sales:** net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commissions, if any, which have passed through the sales account.

**Satellite:** a body that revolves around a larger body, such as the Moon revolving around the Earth, or a man-made object revolving about any body such as the Sun, Earth, or Moon.

**SIC (Standard Industrial Classification):** a system developed by the U.S. government to define the industrial composition of the economy, facilitating comparability of statistics. See *Aerospace Industry* for explanation of SIC codes applicable to the aerospace industry.

**Space Vehicle:** an artificial body operating in outer space (beyond the Earth's atmosphere).

**Stockholder's Equity:** *assets* minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures). For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the *Bureau of the Census*.

**STOL:** short take-off and landing aircraft.

**Test (Department of Defense):** an experiment designed to assess progress in attainment or accomplishment of *development* objectives (see *RDT&E*).

**Thrust:** the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

**Ton-Mile:** one ton moved one mile.

**Total Obligational Authority:** the sum of *budget authority* granted or requested from the Congress in a given year, plus unused *budget authority* from prior years.

**Trade Balance:** see *Merchandise Trade Balance*.

**Transition Quarter (Tr. Qtr.):** the three-month interval from July 1, 1976 to September 30, 1976 belonging to neither Fiscal Year 1976 nor Fiscal Year 1977. See *Fiscal Year*.

**Turbine, Turbo:** a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turbo-prop" or "turbojet."

**UK:** United Kingdom.

**US:** United States of America.

**USA:** United States Army, an agency of the U.S. Department of Defense.

**USAF:** United States Air Force, an agency of the U.S. Department of Defense.

**USN:** United States Navy, an agency of the U.S. Department of Defense.

**USSR:** Union of Soviet Socialist Republics. Statistics continue to exclude this region until official data from the now independent republics become available.

**Utility Aircraft:** an aircraft designed for general purpose flying.

**V/STOL:** vertical short take-off and/or landing aircraft.

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