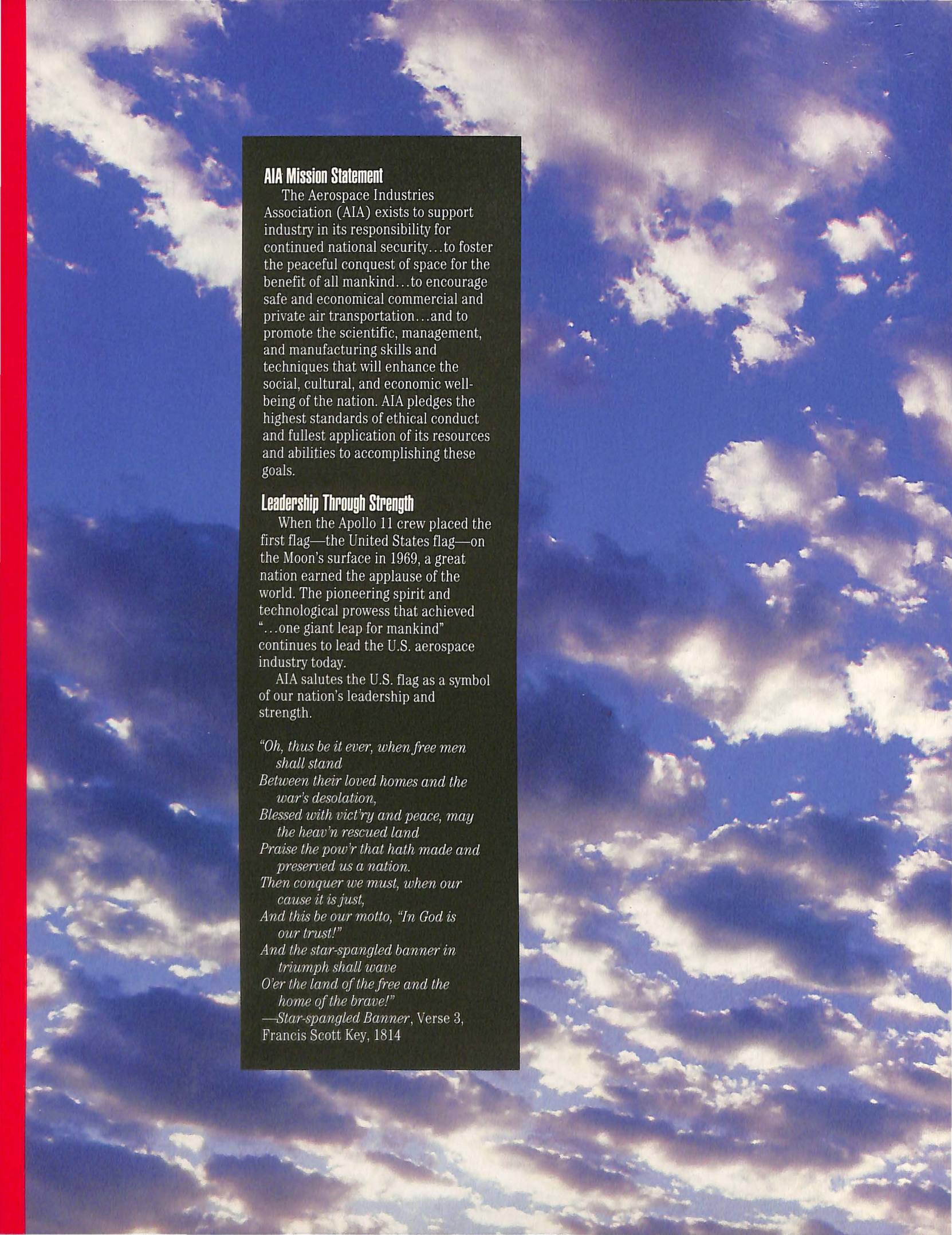
1990 Annual Report

Aerospace Industries
Association of America, Inc.



AIA Mission Statement

The Aerospace Industries Association (AIA) exists to support industry in its responsibility for continued national security…to foster the peaceful conquest of space for the benefit of all mankind…to encourage safe and economical commercial and private air transportation…and to promote the scientific, management, and manufacturing skills and techniques that will enhance the social, cultural, and economic well-being of the nation. AIA pledges the highest standards of ethical conduct and fullest application of its resources and abilities to accomplishing these goals.

Leadership Through Strength

When the Apollo 11 crew placed the first flag—the United States flag—on the Moon's surface in 1969, a great nation earned the applause of the world. The pioneering spirit and technological prowess that achieved "…one giant leap for mankind" continues to lead the U.S. aerospace industry today.

AIA salutes the U.S. flag as a symbol of our nation's leadership and strength.

"Oh, thus be it ever, when free men
shall stand
Between their loved homes and the
war's desolation,
Blessed with vict'ry and peace, may
the heav'n rescued land
Praise the pow'r that hath made and
preserved us a nation.
Then conquer we must, when our
cause it is just,
And this be our motto, "In God is
our trust!"
And the star-spangled banner in
triumph shall wave
O'er the land of the free and the
home of the brave!"
—*Star-spangled Banner*, Verse 3,
Francis Scott Key, 1814

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AIA Chairman's Message

As expected, the collapse of communist regimes in Eastern Europe in the autumn of 1989 has led to a fundamental reexamination of long-term U.S. funding for national security. The current crisis in the Middle East has added another element of uncertainty to a host of questions about national defense that remain unresolved.

For the past half century, our national security has been based on a strategy of deterrence. Rather than matching our adversaries bullet for bullet, we maintained a degree of technological superiority sufficient to overcome the enemy's expected numerical advantage in any conflict. I am convinced that our nation's ability to counter all forms of aggression will continue to rest on the application of our superior technology to our military equipment.

The common task of our government and industry in the years ahead will be to provide the requisite industrial and technological resources for our security while simultaneously reducing America's armed forces, in the words of President Bush, "by 25%," or to "their lowest level since 1950." This is a daunting challenge. It is also one that demands both more specific proposals for change and a higher level of cooperation than have been present in all stages of our defense planning and acquisition.

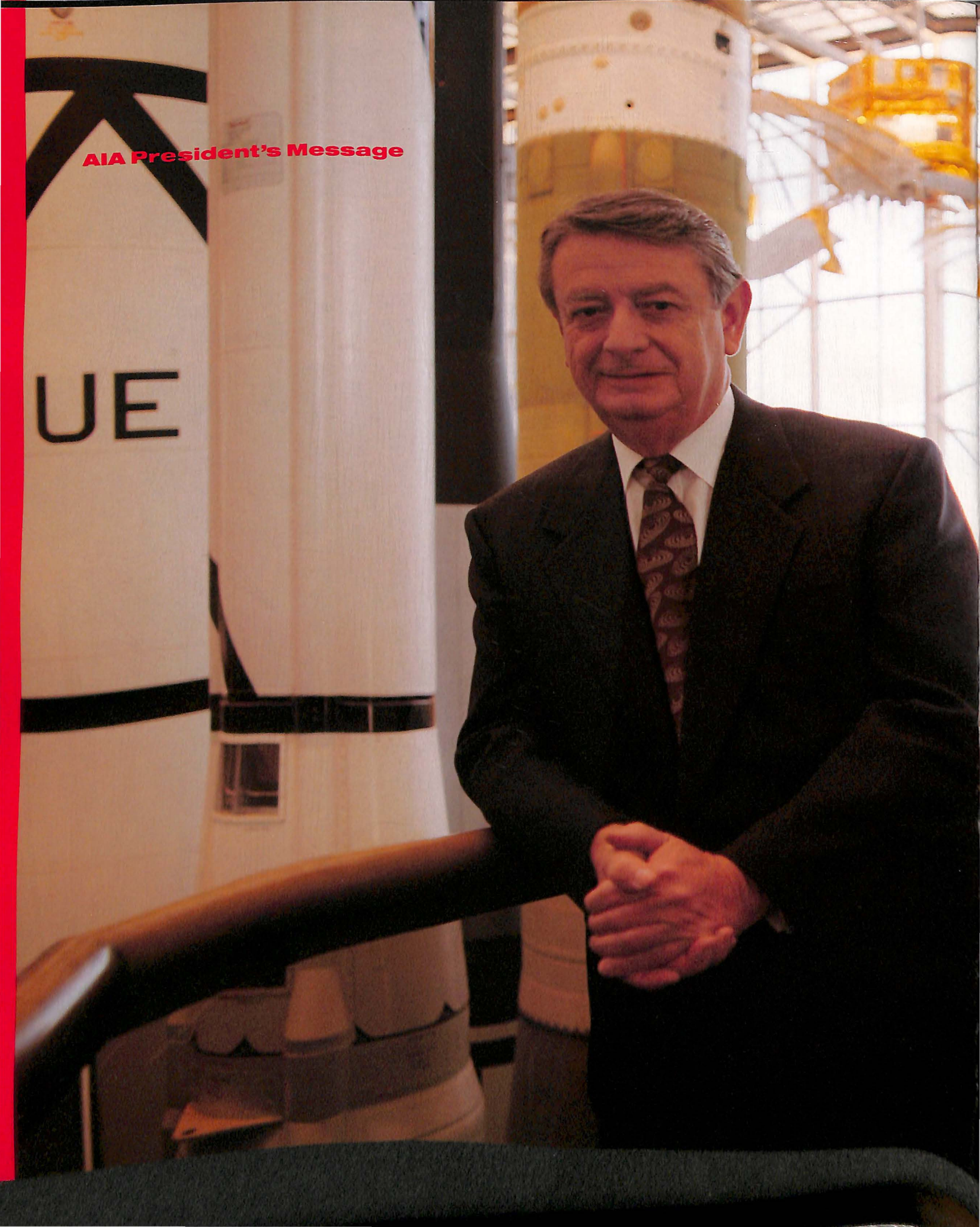
Primarily as a result of the Cold War, our industry built the largest concentration of research and development capability in the world. The aerospace industry, historically, has responded to requirements for new technologies with massive capital investments in facilities and equipment and an increase in its employment of scientists and engineers. With the anticipated build-down of the defense industry and the weakened financial position of most of its companies, new approaches to the preservation of a proper industrial base are needed. Practical solutions must be found.

Previously, I have proposed to Congress and DoD a technical and industrial concept (not an "industrial policy"). Such a concept would require DoD to determine future types of weapon systems and equipment vital for our defense posture after the turn of the century. DoD should ensure that for these selected types of weapon systems and equipment at least one contractor will continue in production at some level through the intervening years. Further, there should be continuous contractor Research and Development (R&D) and periodic block upgrades in the production and fielding of these weapons systems and equipment. For these weapons, we would be keeping R&D and production warm and active, ready for expansion or next-generation weapon development. We would modernize such equipment in the field and would provide closed loop feedback from the field to the contractor for further R&D. While this would probably result in higher unit cost than previously experienced, it should be remembered that DoD would not only be buying product, but also would be buying R&D and production capability as an "insurance policy."

We were pleasantly surprised by the speed and scope of the changes in Eastern Europe. We were just as unpleasantly surprised by the brutal aggression launched against Kuwait. We must, therefore, be prepared for unknown threats of various types and levels of intensity. The time is now for all three concerned parties, Congress, DoD, and industry, to seek a plan or concept for sustaining an adequate technical and industrial base.

Stanley C. Pace
Chairman of the Board

AIA President's Message



The year 1990 was somewhat contradictory for AIA and the industry it represents. It was a good year from the standpoint of sales, in fact, a record year that closed with a backlog of orders reaching an all-time high. Preliminary data show 1990 total aerospace sales rising to more than $131 billion, a 12% increase over 1989. Aerospace exports and the aerospace trade balance reached new peaks at $36.8 billion and $26 billion, respectively. Significantly, large gains in civil aircraft and space systems sales offset a moderate decline in defense sales.

The record backlog of orders as an indicator of continuing prosperity is misleading, however. A closer look at statistical data reveals that, for the first time in nearly a decade, new orders for aerospace systems fell below the previous year's level. In addition, industry sales to DoD declined for the third straight year. We also began feeling the effects of six consecutive negative growth defense budgets, and continuing reductions in military orders will result in significantly lower industry defense sales in the 1990s. Although aerospace sales should increase to $133 billion in 1991, an increase in current dollars of slightly more than 1%, this will represent a decline after being adjusted for inflation.

On a positive note, we anticipate that civil aircraft and space sales will continue to offset substantially the anticipated decline in defense business. Nevertheless, AIA's member companies are tightening their belts and escalating efforts aimed at further improving product quality, increased productivity, and greater cost containment. They are also taking measures to increase both commercial and defense sales to foreign markets in an era that promises further intensified international competition in the aerospace marketplace.

In 1990 AIA worked to improve the industry's financial health and our defense industrial base, which has been eroded by unfavorable government profit, procurement, and tax policies. We sought an increase in progress payments on defense contracts to 90%, a level necessary to bring industry's investment in line with the current prime rate, and we pressed for government recognition of industry-funded Independent Research and Development costs as normal costs of doing business that should be fully recoverable.

In other areas of association activity,

- AIA continued endeavors to simplify the defense acquisition process and adjust acquisition policies to the changing business environment. In the long-running effort to achieve a more equitable and workable regulation on technical data rights, we developed a set of policy principles for DoD's consideration.
- The Key Technologies for the Year 2000 program, sponsored by AIA and conducted by the National Center for Advanced Technologies, passed two major milestones, reaching government-industry-academia consensus on national strategic plans for Rocket Propulsion and Advanced Composites.
- To offset anticipated reductions in the U.S. defense business, AIA urged an affirmative government policy on defense exports, a streamlined export licensing system, and establishment of a system to guarantee export credits for defense products.
- AIA's ongoing initiative to expand Small Disadvantaged Business (SDB) subcontracting resulted in increased awards to SDBs and recognition from Congress. Fifteen aerospace companies, including 13 AIA members, received Congressional Hispanic Aerospace Awards for their subcontracting activity with minority businesses.
- AIA made a deliberate, intensive effort to expand its role in the FAA rulemaking process by identifying potential problems for the aerospace industry and proposing solutions. We commented extensively on regulatory proposals and made specific recommendations that would, if implemented, achieve FAA objectives while minimizing the burden on industry.
- AIA and certain government agencies prepared a report to President Bush recommending the establishment of a single National Industrial Security Program that has strong potential for large-scale savings in industrial security costs.
- The federal government recognized AIA for assisting the National Space Council, NASA, and the Departments of Commerce and Transportation with a series of reports on space exploration planning, space commercialization, launch policy, and the infrastructure needs of the commercial space transportation industry.
- Norman R. Augustine, AIA Board of Governors member and chairman and CEO of Martin Marietta, chaired President Bush's Advisory Committee on the Future of the U.S. Space Program. I was privileged to serve on this committee.

Our 1990 efforts moved us closer to attaining many important industry goals and reinforced our industry's ability to contend with the challenges of this decade. A large measure of our success rests with the enthusiastic, personal participation of the top-level industry management people who serve on AIA's Board of Governors, Executive Committee, and special committees.

Don Fuqua
President

1990 AIA Board of Governors

Member company representatives comprise AIA's Board of Governors. Each year the board elects an Executive Committee from its members to exercise power when it is not in session.

The continued active involvement in 1990 of member company CEOs and other top management in conveying industry's message to Congress and other government officials evoked changes that benefited both the aerospace industry and the nation.

Officers

Stanley C. Pace, *Chairman*
Edsel D. Dunford, *Vice Chairman*
Don Fuqua, *President*
George F. Copsey, *Secretary-Treasurer*

Executive Committee

Edsel D. Dunford, ***Executive Vice President & General Manager, Space & Defense Sector, TRW Inc.***

D. Travis Engen, ***President & Chief Executive Officer, ITT Defense, Inc.***

Don Fuqua, ***President, Aerospace Industries Association***

Edward E. Hood, Jr., ***Vice Chairman of the Board & Executive Officer, General Electric Company***

Richard A. Linder, ***President, Electronic Systems Group, Westinghouse Electric Corporation***

John F. McDonnell, ***Chairman & Chief Executive Officer, McDonnell Douglas Corporation***

Stanley C. Pace, ***Chairman & Chief Executive Officer, General Dynamics Corporation***

Daniel M. Tellep, ***Chairman & Chief Executive Officer, Lockheed Corporation***

Members

Norman R. Augustine, *Chairman & Chief Executive Officer, Martin Marietta Corporation*
Robert N. Burt, *President, FMC Corporation*
Renso L. Caporali, *Chairman, President & Chief Executice Officer, Grumman Corporation*
Malcolm R. Currie, *Chairman & Chief Executive Officer, Hughes Aircraft Company, General Motors Corporation*
Beverly F. Dolan, *Chairman & Chief Executive Officer, Textron Inc.*
Roy H. Ekrom, *President & Chief Executive Officer, Allied-Signal Aerospace Company*
Phillip W. Farmer, *President, Electronic Systems Sector, Harris Corporation*
U. Edwin Garrison, *President & Chief Executive Officer, Thiokol Corporation*
Clyde R. Gillespie, *Vice President, Engineered Products, Aluminum Company of America*
Raymond A. Hay, *Chairman & Chief Executive Officer, The LTV Corporation*
Sam F. Iacobellis, *Executive Vice President & Chief Operating Officer, Rockwell International Corporation*
E. Gene Keiffer, *Chairman of the Board & Chief Executive Officer, E-Systems, Inc.*
Kent Kresa, *President & Chief Executive Officer, Northrop Corporation*
William B. Mitchell, *President, Defense Systems & Electronics Group, Texas Instruments Incorporated*
Dennis J. Picard, *President, Raytheon Company*
Roger I. Ramseier, *President & Chief Executive Officer, Aerojet*
Paul G. Schloemer, *President & Chief Executive Officer, Parker Hannifin Corporation*
Richard Schwartz, *Senior Vice President, Hercules, Inc. & President, Hercules Aerospace Company*
Frank A. Shrontz, *Chairman-Chief Executive Officer, The Boeing Company*
Harry Stonecipher, *President & Chief Executive Officer, Sundstrand Corporation*
Arthur E. Wegner, *Executive Vice President, United Technologies Corporation & President, Aerospace/ Defense*
Robert L. Witt, *President & Chairman of the Board, Hexcel Corporation*
Paul E. Wright, *Chairman, Chrysler Technologies Corporation*

AIA Senior Staff

To assist in fulfilling its mission to the aerospace industry, AIA is organized into departments, each led by a senior staff professional. Departments support the efforts of the member-comprised councils, committees, subcommittees, task groups, advisory groups, and ad hoc groups.

AIA staff relays technical, policy, and administrative developments to members through regular workshops, seminars, special reports, routine memoranda, and regular publications.

A full report of association activities begins on page 32.

Standing, left to right: LeRoy J. Haugh, *Vice President*, Procurement and Finance; Stan Siegel, *Vice President*, Technical and Operations; Daniel J. Nauer, *Vice President*, Human Resources; Don Fuqua, *AIA President*; Robert E. Robeson, Jr., *Vice President*, Civil Aviation; Herbert E. Hetu, *Vice President*, Communications; Joel L. Johnson, *Vice President*, International; Thomas N. Tate, *Vice President*, Legislative; George F. Copsey, *Secretary-Treasurer*. **Seated, left to right:** Sandra W. Wobbe, *Assistant Vice President*, Policy and Planning; Virginia C. Lopez, *Executive Director*, Research Center

Aerospace Highlights 1990

The Northrop/McDonnell Douglas YF-23A (right) and the Lockheed/Boeing/ General Dynamics YF-22A (center page) completed initial testing in the Air Force's Advanced Tactical Fighter program.

E-Systems developed a Distributed War Simulation system to give decision makers operational experience without the costs/risks associated with live field exercises.

In December the V-22 Osprey, being jointly developed by Bell Helicopter Textron and Boeing Helicopters, completed shipboard compatibility tests. The Number One test aircraft reached a milestone when it made its 100th flight in October.

DEFENSE

For the U.S. Department of Defense (DoD), 1990 was a turbulent year as the military services sought to "downsize" their forces in orderly fashion, yet supply and deploy a large force in the Persian Gulf to contain further aggression by Iraq.

It was a year characterized by significant reductions in deliveries of new aerospace defense systems, particularly military aircraft. Budget reductions necessitated adjustments and stretchouts of a number of major military equipment programs. There was, nonetheless, solid progress among development and production programs being conducted for DoD by aerospace industry companies.

A developmental highlight of the year was the completion of initial tests of the competing aircraft in the Air Force Advanced Tactical Fighter (ATF) program: the YF-22, being developed by a Lockheed/General Dynamics/Boeing team, and the YF-23, being developed by Northrop/McDonnell Douglas. Both aircraft feature low radar, infrared, and visual signatures (stealth technology) and both are advanced "blended wing/body" designs. Both are being tested with two different engines, the Pratt & Whitney F-119 and the General Electric F-120.

The YF-123 started its flight test program on August 27 and achieved supersonic flight without afterburning on November 29. By year-end the two YF-123 prototypes had flown more than 50 missions. The YF-122 made its first flight on September 29 and also completed more than 60 flights, including supersonic tests, by year-end. Both teams were expected to submit proposals early in January 1991, and Air Force selection of one team for full-scale ATF development was planned by April 30.

In other advanced aircraft developments,

- The Air Force/Northrop B-2 stealth technology bomber continued in-flight test status. The two prototypes, the first of which made its initial flight on July 17, 1989, had logged some 120 hours by year-end 1990. The B-2 is powered by four General Electric F-118 engines; other major subcontractors include The Boeing Company, LTV Aircraft Products Group, Hughes Radar Systems, Honeywell Inc., and Link Flight Simulation Corporation.
- On July 12 the 59th and final F-117A stealth fighter, developed by Lockheed

The Air Force/Northrop B-2 Advanced Technology Bomber continued a successful flight test program; by year-end, two prototypes had logged 120 hours.

Polymer chemists at Rohr Industries developed a procedure for producing an improved polyimide resin for high-temperature aircraft structures; the process minimizes methylenedianiline (MDA) levels, reducing health concerns associated with MDA.

In September the Army Strategic Defense Command successfully tested a long-wave infrared sensor developed for ballistic missile defense by Hughes Aircraft Company; aboard a Boeing 767, the sensor generated tracks made by ICBM reentry vehicles.

Lockheed delivered the 59th and final F-117 stealth fighter to the Air Force in July.

The Air Force was evaluating two YA-7F upgrade prototypes built by LTV Aircraft Products Group for possible Air National Guard service.

In June Boeing Defense & Space Group's Helicopter Division started flight tests of the MH-47E, a new member of the Chinook family designed for use by the Army's Special Operations Aircraft Regiment.

Advanced Development Company, was delivered to the Air Force after eight years of production.

- The Navy A-12 Avenger attack aircraft, being developed by General Dynamics and McDonnell Douglas, entered initial construction status. At year-end the A-12 program was under review by DoD.
- The YA-7F prototypes built by LTV Aircraft Products Group were undergoing flight evaluations. An upgraded version of the A-7D, the A-7F is being considered for production as an Air National Guard airplane.
- On March 22 Grumman Corporation rolled out the first Navy F-14D Tomcat of a planned program involving construction of 37 new planes and conversion of 400 F-14As to "D" configuration, with new engines (General Electric F-110), radar, and avionics.
- The Navy-managed X-31 enhanced fighter maneuverability program moved into flight test status with an initial flight on October 11. A joint U.S./Germany development, the aircraft is being developed by Rockwell International and Germany's Messerschmitt-Bolkow-Blohm.
- The Number Two prototype Joint STARS aircraft conducted a successful six-week demonstration tour of Europe in the fall and both prototypes continued flight tests. The Joint STARS aircraft, planned for operational service in the 1990s, are modified Boeing 707s developed by Grumman Melbourne Systems for Air Force/Army target detection and classification.
- McDonnell Douglas completed assembly of the first Air Force C-17 airlifter and had eight others in various stages of assembly by year-end. First flight was scheduled for June 1991 but might be made earlier.
- The Navy/Bell-Boeing V-22 tiltrotor aircraft completed shipboard compatibility tests in December and began night takeoff and landing evaluations.
- At year-end, the Army was evaluating proposals from two teams in the Light Helicopter competition. Bell Helicopter Textron is teamed with McDonnell Douglas Helicopter Company, and Boeing Helicopters is working with Sikorsky Aircraft. Completion of the evaluation process was expected in February 1991.

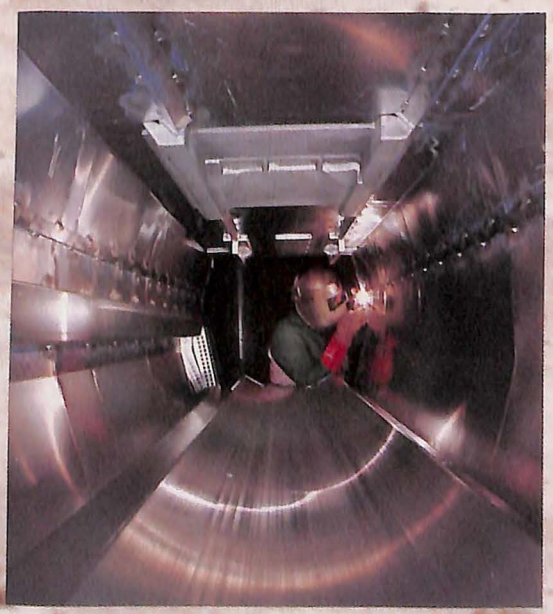
(Above) In July the first Air Force/McDonnell Douglas C-17 airlifter moved out of the automated major join tool to continue through the production line on its landing gear, on schedule for assembly completion by year-end. Artist's concept is at right.

Parker Hannifin Corporation recorded growth in its maintenance, repair, and overhaul operations, exemplified here by an F/A-18 field support team.

Lucas Aerospace Power Transmission Corporation developed flexible power takeoff (PTO) shafts for the YF-22A and YF-23A Advanced Tactical Fighter competitors. Shown here is the PTO shaft for both Pratt & Whitney and General Electric engine installations on the YF-23A.

In March Grumman Corporation rolled out the first new construction Navy F-14D Tomcat (above).

In August McDonnell Douglas Helicopter Company delivered the 600th AH-64 Apache combat helicopter, shown here in Saudi Arabia launching a Hellfire missile in an Operation Desert Shield test.



An LTV Missiles and Electronics Group technician puts finishing touches on a launch pod container for the LTV-developed Army Tactical Missile System.

A mock-up shows the small size and portability of Hughes Aircraft's 20-pound Short-Range Antitank Weapon. Hughes' Missile Systems Group is competing with Ford Aerospace for a Marine Corps full-scale development contract.

Harris Corporation digital map systems are being used to aid development of the Army's Light Helicopter. The systems provide pilots with computerized cockpit displays of terrain and targets for all-weather operations.

Textron Specialty Materials was developing new types of composite structures, among them this metal matrix composite (aluminum) structure for advanced fighter aircraft.

The Navy/Lockheed Trident II fleet ballistic missile (center page) completed certification tests and achieved initial operational capability in March.

Patriot tactical air defense missile launchers were deployed in Saudi Arabia in August as part of Operation Desert Shield. Raytheon Company is prime contractor for the Patriot system.

• On November 12 Boeing Helicopters delivered the 240th Army CH-47D and completed a multiyear modernization contract awarded in 1985. On the same day, the company delivered the first of 144 additional modernized CH-47Ds to be built on another contract that runs through 1993. In June Boeing initiated flight tests of the MH-47E, a CH-47 derivative for the Army's special operations forces.

• On August 13 McDonnell Douglas Helicopter Company delivered the 600th AH-64 multirole helicopter to the Army. The company was producing six AH-64s a month and expected to complete the production run of 807 aircraft in 1993.

Highlighting the year's missile development activity was the achievement in March of initial operational capability by the Lockheed-built Trident II (D-5) fleet ballistic missile, after completion of a lengthy series of certification tests. During the test program, the Navy launched 31 D-5 missiles, 19 from a Cape Canaveral pad and 12 from the submerged submarines *USS Tennessee* and *USS Pennsylvania*. A series of underwater operational tests was planned.

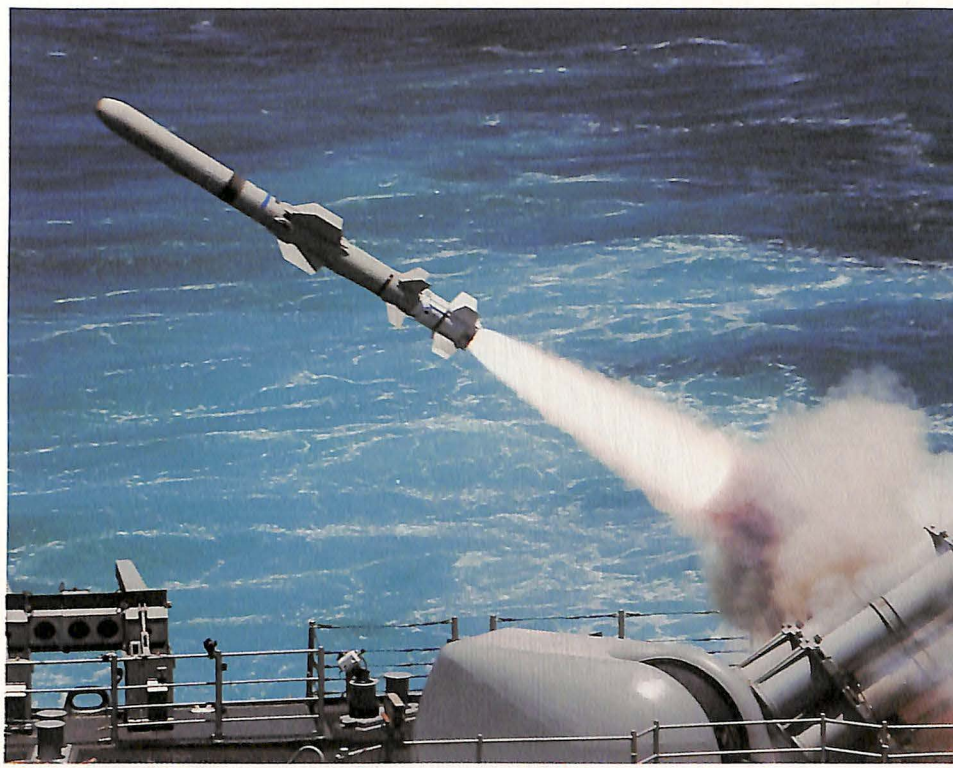
Development continued on both the Small ICBM (SICBM) and the "rail garrison" mobile ICBM, which involves basing the existing 50 Peacekeeper missiles aboard 25 mobile rail cars dispersed throughout the U.S. railway system. There was some debate in Congress on whether both weapon systems are needed, but Congress provided R&D money for both programs. In November Rockwell Command and Control Systems delivered the first launch control car engineering model.

Principal contractors for SICBM are TRW Inc. (system engineering), Thiokol (first stage), Aerojet (second stage), Hercules (third stage), and Rockwell Autonetics (guidance). Contractors for the railmobile Peacekeeper include Westinghouse (missile launch car and canister), Rockwell (launch control system), along with major Peacekeeper contractors Martin Marietta Aerospace (integration and assembly), Thiokol (first stage), Aerojet (second stage), Hercules (third stage), Rockwell Rocketdyne (fourth stage), and Honeywell Inc. (guidance and control elements).

In other missile activity,

• Flight testing continued on the Air Force stealth technology Advanced Cruise Missile, prototypes of which have been built by General Dynamics and McDonnell Douglas, potential second source. The first of four planned General Dynamics full-scale development test vehicles was flown early in 1990. The initial McDonnell Douglas full-scale development missile was delivered to the Air Force in May. Two test vehicles were flown in 1990.

In development by Sundstrand Corporation in 1990 was the Ram Air Turbine for the USAF's C-17 airlifter. The power turbine is shown undergoing test in Sundstrand's wind tunnel facility.



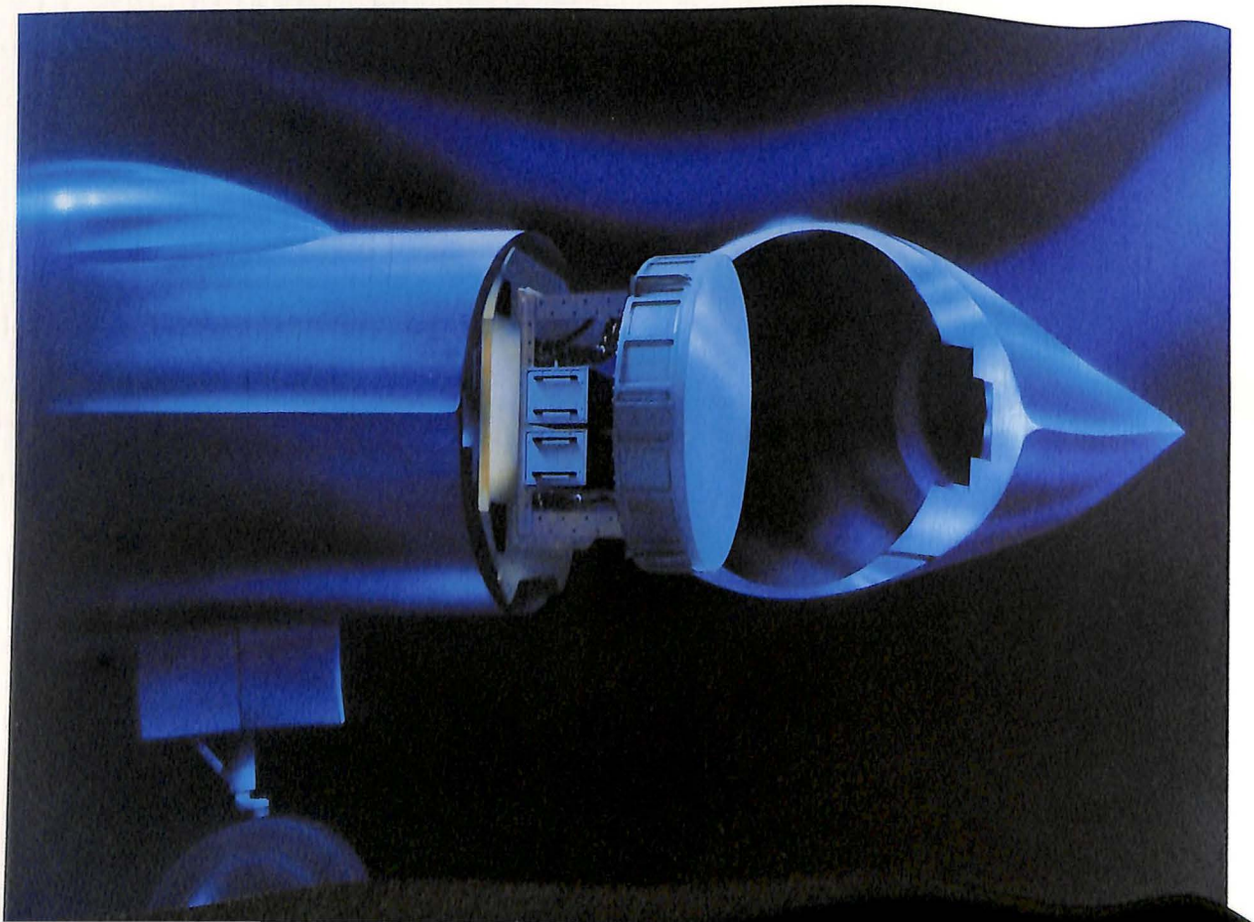
In June a Navy/McDonnell Douglas Standoff Land Attack Missile was launched for the first time from a surface ship. The weapon, normally launched from carrier-based aircraft, is being evaluated for ship-launch potential.

In development as a Texas Instruments/Martin Marietta joint venture was the Advanced Antitank Weapon System-Medium, a fire-and-forget manportable system for Army and Marine Corps use.

In March Kaman Aerospace Corporation delivered to the Navy the first production SH-2G Super Seasprite helicopter.

Bechtel National, Inc., developed a Weapons Storage and Security System for enhanced survivability of stored weapons, including a hardened vault and a display system for viewing vault status. It was installed at three Air Force bases and additional installations are planned.

- The Navy continued tests of the Tomahawk Sea-Launched Cruise Missile from submerged submarines. General Dynamics and McDonnell Douglas are the principal contractors .
- The Boeing-built, air-launched Short Range Attack Missile II (SRAM-T) successfully completed its first captive carriage test flight on November 4. The missile was carried aloft by an F-15E. A 10-flight test program was to continue into 1991. The missile is designed to be carried externally by tactical F-15s, internally by the B-1B and B-2 strategic bombers.
- Adapting technology from its widely-used TOW antitank missile, Hughes Missile Systems Group initiated a demonstration/validation program for a new Short-Range Antitank Weapon (SRAW) intended for Marine Corps use. Hughes is competing with Ford Aerospace for a full-scale development award. Plans call for first production deliveries in 1997.
- In April the Army's Advanced Antitank Weapon System-Medium (AAWS-M) passed its critical design review, and testing was initiated late in the year. At year-end, AAWS-M reached the midpoint of a 36-month, full-scale development program being conducted by the industry team of Martin Marietta and Texas Instruments.
- Development continued on the Navy Advanced Air-to-Air Missile (AAAM) program with awards in October to two industry teams for an additional phase of the demonstration/validation program. The new contract runs through December 1992. The competing teams are Hughes/Raytheon and General Dynamics/Westinghouse.



Both competing teams in the Air Force Advanced Tactical Fighter (ATF) program selected the Active Electronically Scanned Array radar being developed jointly by Texas Instruments and Westinghouse. Pictured is a mock-up of the array, which houses circuitry that provides the transmit/receive functions of the ATF radar.

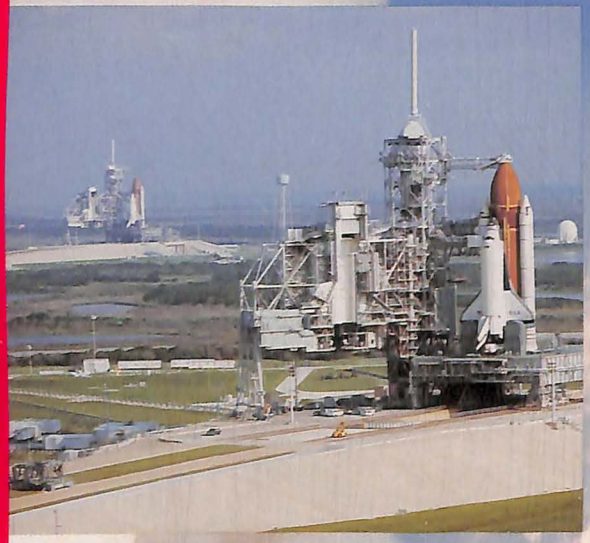
In September the TRW/ Israel Aircraft Industries Short Range Unmanned Aerial Vehicle (below) made a successful first flight. Unmanned aerial vehicles developed by the TRW/IAI team and by McDonnell Douglas Missile Systems Company are to be evaluated by the U.S. government in 1991.

An upgraded Navy/Hughes Aircraft Phoenix long-range fleet defense air-to-air missile was fired for the first time in July from an F-14A. The test verified the upgraded missile's significantly increased launch-and-leave range capabilities.

Among equipment deployed in Operation Desert Shield was FMC Corporation's Bradley Fighting Vehicle.

Rockwell International was conducting an avionics modernization program for the USAF F-111F. The company also received a contract from the Royal Australian Air Force to update F-111 Avionics.

Martin Marietta Astronautics Group provided the Faint Object Spectrograph for the Hubble Space Telescope, which was Shuttle-launched in April.



This rare view of two Space Shuttle systems on launch pads shows Orbiters *Columbia* (foreground) and *Discovery* being readied for flight by technicians of NASA and Lockheed Space Operations Company, NASA's principal Shuttle processing contractor. The Shuttle flew six missions in 1990.

A General Dynamics Atlas/Centaur (center page) launched the CRRES satellite, an experiment in electric field measurement, in July. It marked the first flight of the company's commercial Atlas.

At right, the Hughes-built Syncom IV-5, last of a five-satellite Navy communications satellite network, was launched in January.

SPACE

Among space highlights of 1990 was the solid performance of NASA's Space Shuttle, which flew six successful missions despite a five-month standdown in the summer. The final three missions were launched within a 58-day period.

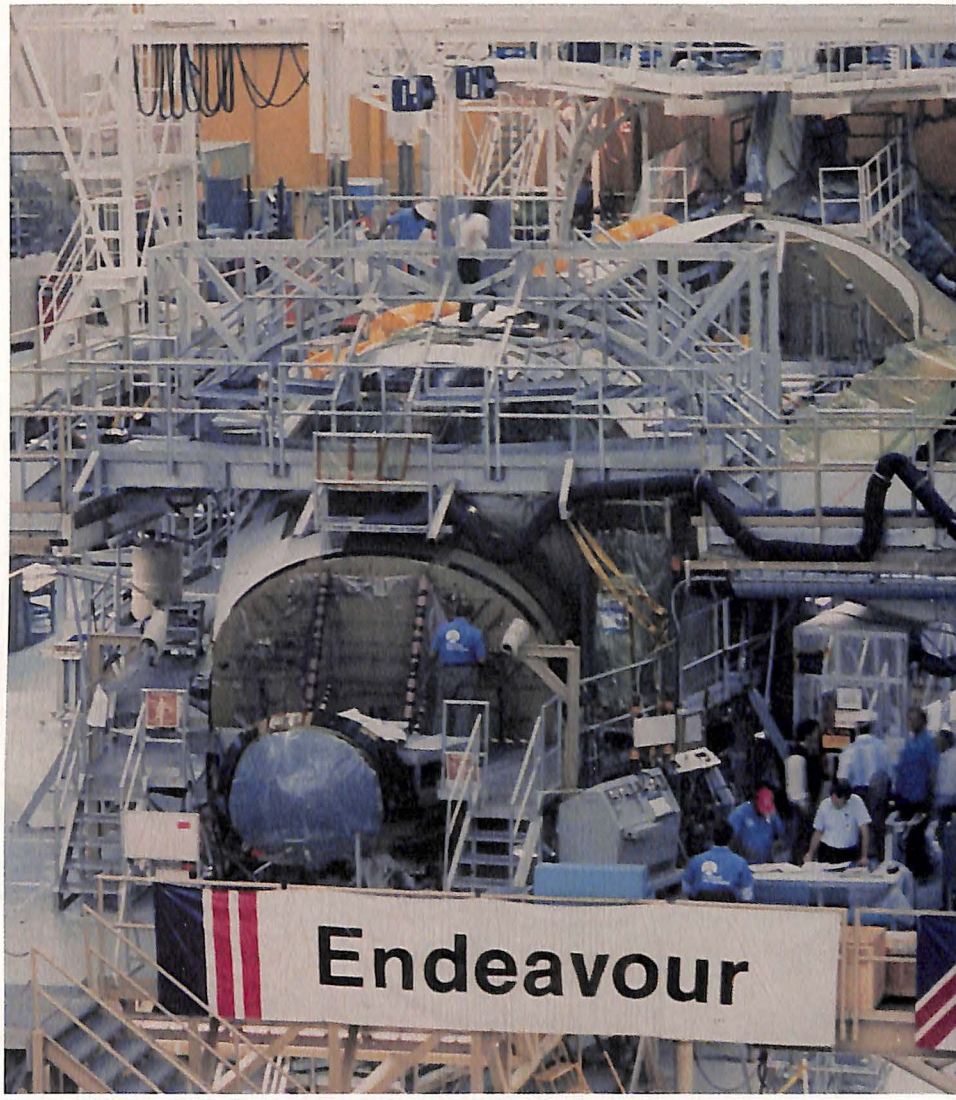
The Shuttle started its year's work with a January 9 launch of the Orbiter *Columbia* on a dual assignment. Its initial job, successfully accomplished on January 10, was deployment of the Navy Syncom IV-5 communications satellite. Built by Hughes Communications Services, Inc., Syncom was the last of a five-satellite network owned by the company and leased to the Navy.

Columbia's other task, carried out on January 12, was retrieval of the LDEF (Long Duration Exposure Facility) delivered to orbit in 1984 carrying some 10,000 specimens—materials, coatings, solar cells, living organisms—for investigations of what happens to such samples over a long period of space exposure. LDEF was successfully retrieved and returned to Earth for study.

On the second Shuttle mission of the year, Orbiter *Atlantis* was launched February 28 on a classified Department of Defense (DoD) mission.

Orbiter *Discovery* flew the third Shuttle mission, the highlight of which was the April 25 deployment of the Hubble Space Telescope (HST), the first of NASA's Great Observatories series. Initial operations disclosed a defect in the HST's mirror system that cannot be corrected by Earth commands but will be corrected on a 1993 Shuttle rendezvous/repair mission. The optical flaw affected only a portion of the satellite's instrument system and the HST was able to acquire and transmit to Earth many scientifically useful images. NASA reported that much of the scientific agenda can be accomplished before the repair mission and that officials believed that 100% of the highest priority science would eventually be performed. Lockheed Missiles & Space Company built the HST spacecraft; the Optical Telescope Assembly was designed and built by Perkin-Elmer Corporation (now Hughes Danbury Optical Systems, Inc.).

In April leaks were discovered in the fuel line connections between the Orbiter and its external



At year-end the new Shuttle Orbiter *Endeavour* (above) neared completion on schedule for spring 1991 delivery to NASA.

In April the Orbital Sciences/Hercules Inc. commercially developed, air-launched booster made its initial flight after drop from a B-52.

Shown in pre-launch checkout, Hughes Aircraft's Palapa B-2R (right), a communications satellite for Indonesia, was launched in April.

The IBM Command and Control Segment manages satellite-transmitted data for the Air Force Satellite Control Network.

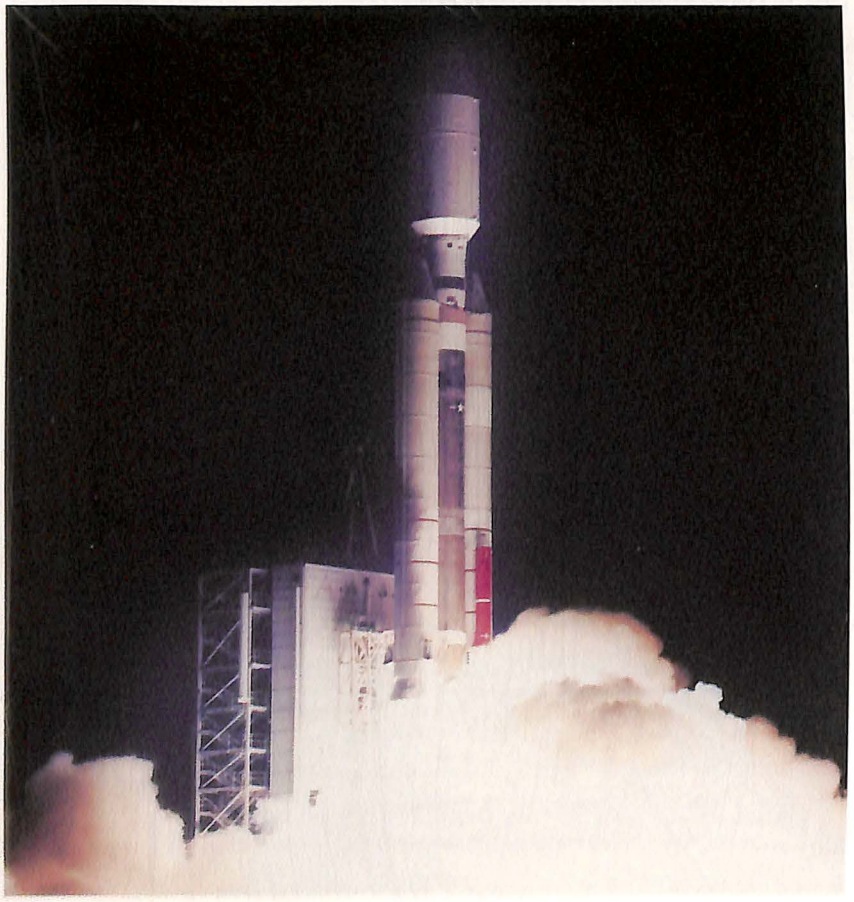
tank in both the *Atlantis* and *Columbia* systems. All Shuttles were grounded for five months while the problems were identified and corrected.

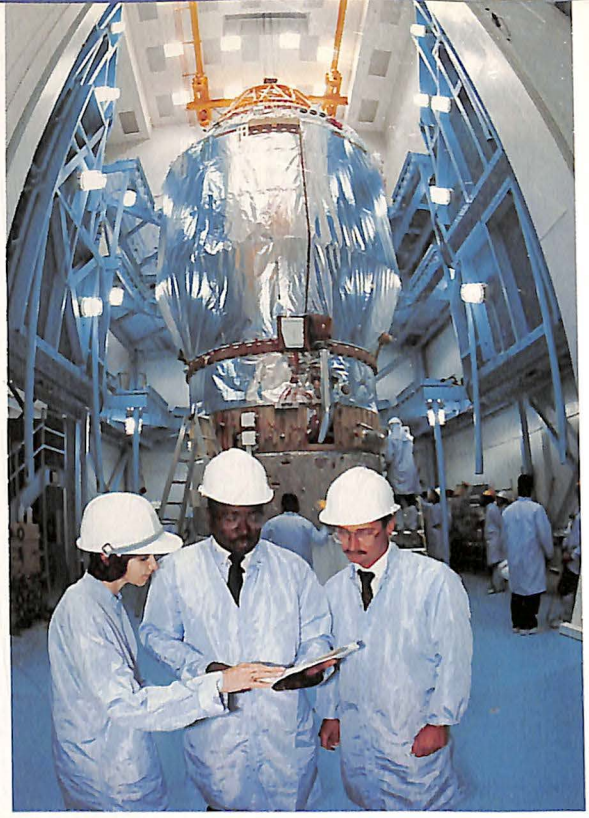
Flight operations resumed with the October 6 launch of *Discovery* carrying the Ulysses interplanetary spacecraft. A joint NASA/European Space Agency project, Ulysses was launched on a multiyear journey to the Sun's polar regions, which have never been explored by spacecraft.

The fifth mission of the year came on November 15 when *Atlantis* was sent into orbit with a classified DoD payload.

The Shuttle year concluded with a 10-day science mission launched December 2. Orbiter *Columbia* carried a 12 1/2-ton observatory called Astro, which conducted extensive ultraviolet/x-ray astronomy despite failure of some systems.

At year-end, construction of the new Orbiter *Endeavour* remained on schedule and near completion. Delivery was planned for spring 1991. Principal contractors for the Space Shuttle program are Rockwell International (orbiters and main engines), Thiokol (solid rocket boosters), and Martin Marietta (external tanks).





A General Dynamics Titan Centaur 8, upper stage of the Titan IV launch vehicle, is being readied for tests at the Space Systems Divison's thermal acoustic annex.

In other civil space activity,

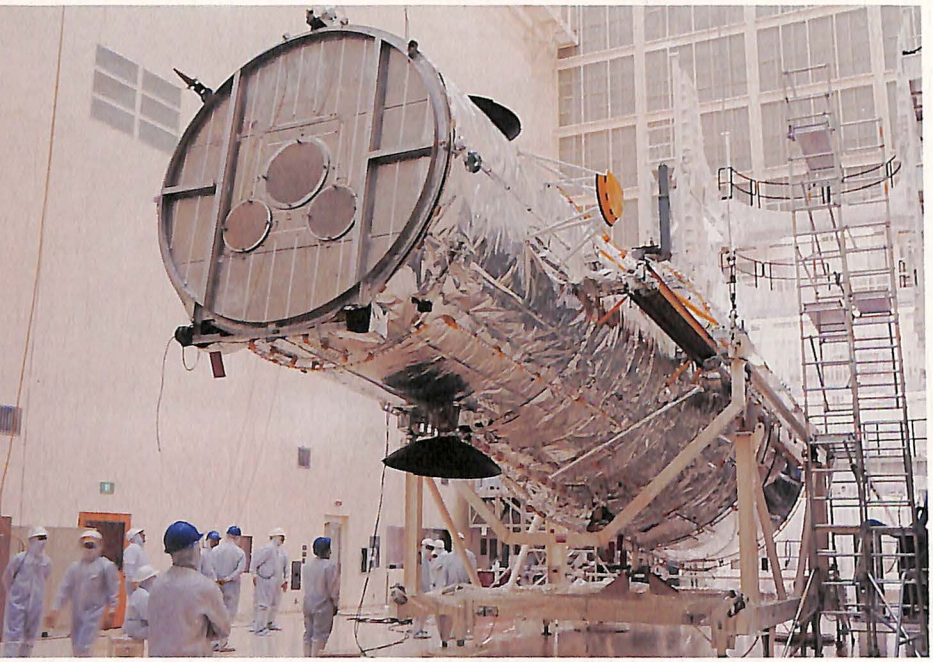
- NASA launched—on June 1—the ROSAT x-ray imaging satellite, a joint U.S./Germany/United Kingdom project for a sweeping five-year study of x-ray sources.
- The commercially-developed Pegasus air-launched booster, a joint venture of Orbital Sciences Corporation and Hercules Incorporated, made its initial flight on April 5, placing two small satellites in polar orbit.
- The CRRES (Combined Release and Radiation Effects Satellite) payload, a joint NASA/DoD experiment in space electrical field measurement, was launched July 25 by an Atlas/Centaur launch vehicle. It marked the first flight of General Dynamics' commercial Atlas. The satellite was developed by Ball Corporation's Space Systems Division.
- Two communications satellites built by General Electric Astro-Space Division were launched into geostationary orbit on October 12 by a French Ariane vehicle. The satellites were Satcom C-1, operated by GE American Communications, and GSTAR IV, operated by GTE Spacenet.
- Palapa B-2R, a communications satellite linking Indonesia with other Indian/Pacific ocean nations, was launched April 12 by a McDonnell Douglas Delta II booster. The satellite was built by Hughes Aircraft Company, a unit of GM Hughes Electronics.

In October McDonnell Douglas launched its 200th Delta vehicle, delivering an Inmarsat maritime satellite to geosynchronous orbit.

In June a Martin Marietta Commercial Titan III launched the Hughes-built Intelsat VI (F-4) satellite into geosynchronous orbit.

On August 10 NASA's Martin Marietta-built Magellan spacecraft (center page) entered orbit around Venus to begin a detailed mapping of the planet by a radar sensor developed by Hughes Aircraft Space and Communications Group.

At right, Rohr Industries fabricators install insulation on the aft closure section of a Titan solid rocket booster motor.



Manifested for Space Shuttle launch in November 1991 is the Upper Atmosphere Research Satellite being developed by GE-Astro Space.

The January flight of the Army/McDonnell Douglas HEDI space interceptor demonstrated Aerojet's innovative platelet technology for reducing the 3,500-degree heat of hypersonic flight to a condition approaching room temperature.

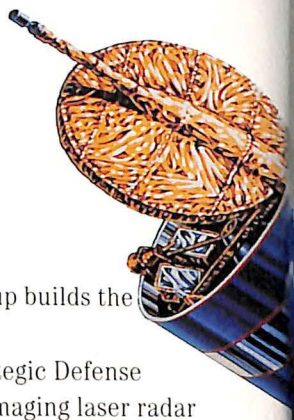
During 1990 the USAF launched three more Navstar navigation satellites built by Rockwell International.

- On June 2 the last of the McDonnell Douglas Delta I boosters launched Insat ID, a multipurpose satellite for the government of India. It was the fourth commercial launch for McDonnell Douglas.
- The Hughes-built Intelsat VI (F-4), the second of the VI generation and the 15th in the satellite network operated by the International Telecommunications Satellite Organization, was launched into geosynchronous orbit June 22 by a Martin Marietta Commercial Titan III booster.

Among new civil space projects initiated in 1990,

- GE Astro-Space Division was selected in December to design and build four Inmarsat communications satellites for the International Maritime Satellite Organization, the first scheduled for 1994 delivery.
- In April the Brazilian government contracted with Hughes Aircraft to provide two HS 376W satellites for the country's second generation telecommunications satellite system to be launched in 1993-94.

In 1990 military space activity, a highlight of the Strategic Defense Initiative (SDI) was the successful first flight in January of the Army Strategic Defense Command's HEDI (High Endoatmospheric Defense Interceptor), a non-nuclear missile designed to intercept incoming warheads in the upper atmosphere. A second flight, in which the weapon's infrared seeker will be tested, was planned for the fall of 1991 and a third about a year later. McDonnell Douglas Space Systems Company is prime contractor and Hughes Missile Systems Group builds the infrared seeker.



In other SDI activity, the Strategic Defense Initiative Organization used an imaging laser radar in an experiment called Firefly (a March sounding rocket flight) to demonstrate that decoy reentry vehicles can be discriminated from real warheads. In June SDI demonstrated the ability to bounce a laser beam from one place to another by means of an orbiting mirror. Prime contractor for the Relay Mirror Experiment was Ball Space Systems Division.

A major SDI project, the Airborne Optical Adjunct reached flight test status; first flight was made in May aboard a modified Boeing 767. Prime contractor for the infrared sensor for long-range detection and tracking of ballistic missiles is Boeing Aerospace & Electronics.

Other military space highlights included the December launch of another GE Astro-Space DMSP (Defense Meteorological Satellite Program) spacecraft to support Operation Desert Shield and completion of an initial round of tests of the Milstar defense communications satellite by Lockheed Missiles & Space Company. Delivery of the first operational satellite was targeted for mid-1992.

During the year, the USAF launched three additional satellites of the Block II Navstar Global Positioning System; nine of the 21-spacecraft operational constellation were in orbit. The Navstars are built by Rockwell International and launched by McDonnell Douglas Delta II boosters.

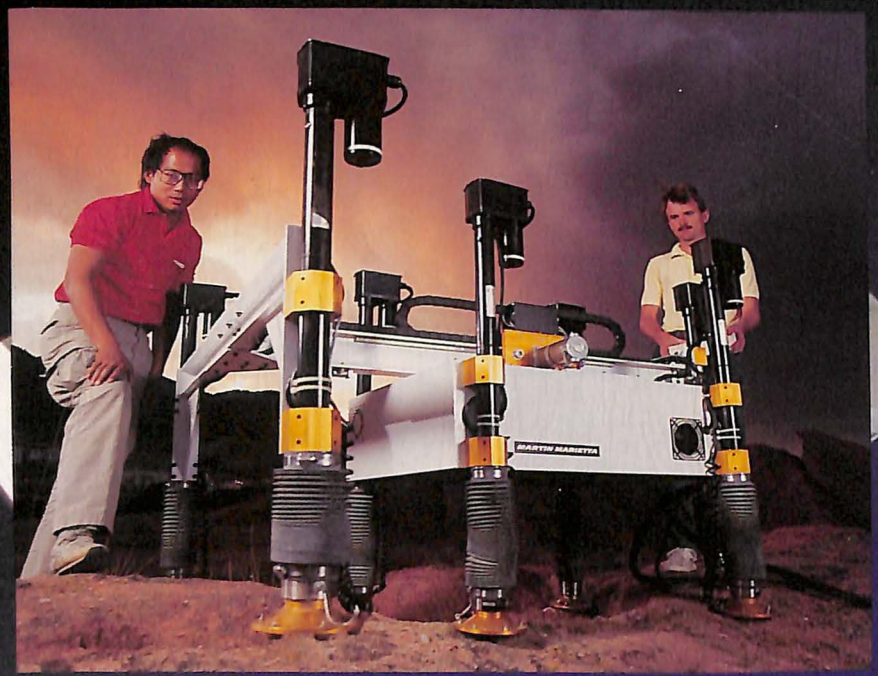
Shown here is a cooling tower foundation that is being converted to a storage facility for NASA's Advanced Solid Rocket Motor (ASRM) at Yellow Creek, Mississippi. Groundbreaking ceremonies were held in April for conversion of the never-completed nuclear facility to a production plant for the ASRM, being built by Aerojet under contract to Lockheed Missiles & Space Company.

In April the Brazilian government selected Hughes Communications International to build the country's second generation satellite communications system. Hughes will provide two HS 376W satellites, ground equipment, and personnel training. Launches are planned for 1993/1994.

The USA Division of Thiokol Corporation continued production of four models of the Castor solid propellant rocket motors for expendable launch vehicles; Castors have achieved 1,735 successful firings over 31 years.

The NASA Gamma Ray Observatory (center page) was shipped to Kennedy Space Center in February for a planned 1990 launch that was delayed until April 1991 by the Space Shuttle's five-month standdown. TRW Space & Technology Group is NASA's prime contractor.

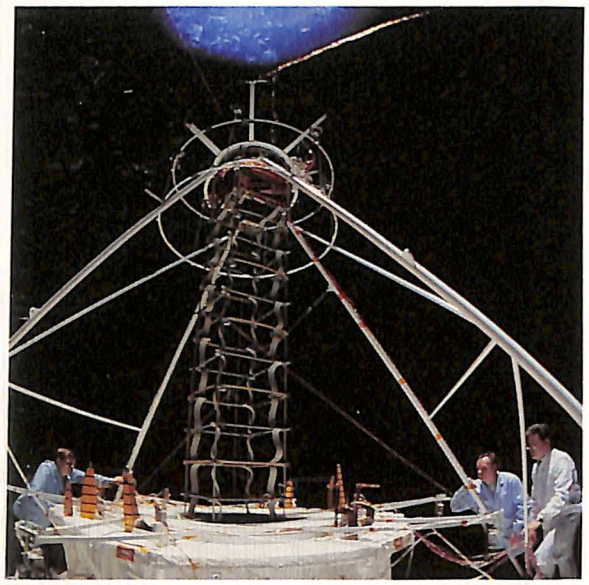
E-Systems developed a low-cost imagery work station that allows analysts to process and track large amounts of data quickly .



Looking to tomorrow, Martin Marietta Space Systems developed under NASA contract this one-quarter scale model of a robotic "walking beam" rover to explore Mars and collect soil and rock samples.

At year-end Aerojet, Pratt & Whitney, and Rockwell's Rocketdyne were completing a teaming arrangement for joint development of an Advanced Launch System. The photo shows a test of an Aerojet-developed subscale injector for an advanced launch vehicle propulsion system.

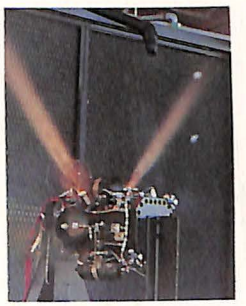
In development by Martin Marietta Space Systems is the Flight Telerobotic Servicer, intended to play a role in assembly of Space Station *Freedom* and later become a station adjunct for servicing and repair tasks.



Martin Marietta Astronautics Group completed the initial construction and test phase of a deployment system for the NASA/Italian Space Agency Tethered Satellite System. The system will enable deployment of reusable satellites from the Shuttle Orbiter at the end of a long tether. Italy's Aeritalia is building the spacecraft, slated for first orbital flight in March 1992.

Among civil/military spacecraft in development in 1990 were:

- The Gamma Ray Observatory (GRO) and the Advanced X-ray Astrophysics Facility (AXAF), the second and third of NASA's Great Observatory series, both built by TRW Inc. GRO was scheduled for launch in April 1991; AXAF is planned for launch in 1997.
- The Earth Observing System (EOS), the key element of NASA's Mission to Planet Earth, which contemplates a long-term (20 years or more), internationally coordinated, comprehensive investigation of Earth's atmosphere, oceans, land surfaces, and polar regions. The program embraces a series of large orbiting platforms, to be developed by the U.S., Japan, and the European Space Agency, supported by small-to-moderate-size specialized satellites. First U.S. EOS platform launch is planned for 1997.
- Space Station *Freedom*, which was undergoing major redesign due to large NASA budget cuts. Assembly completion and operational service, earlier planned for 1999, will slip further. U.S. segments of the Space Station are being developed by four contractor teams headed by Boeing Aerospace, McDonnell Douglas, GE Astro-Space, and Rockwell International's Rocketdyne Division.
- The Upper Atmosphere Research Satellite (UARS), which will report global data on the composition of the upper atmosphere over several years. Principal UARS contractor is GE Astro-Space Launch is manifested for November 1991.
- Topex/Poseidon, a remote sensing satellite being developed by Fairchild Space and Defense Corporation to expand knowledge of ocean dynamics. Launch is planned for 1992.
- The National Aero-Space Plane (NASP), a joint NASA/DoD development of a vehicle capable of horizontal takeoff and sustained hypersonic flight in the atmosphere or into orbit. Contractors, operating as a coordinated team, include General Dynamics/McDonnell Douglas/Rockwell International (airframe design) and Pratt & Whitney/Rockwell Rocketdyne (propulsion systems). A 1990 highlight was the October selection of basic airframe and propulsion configurations.

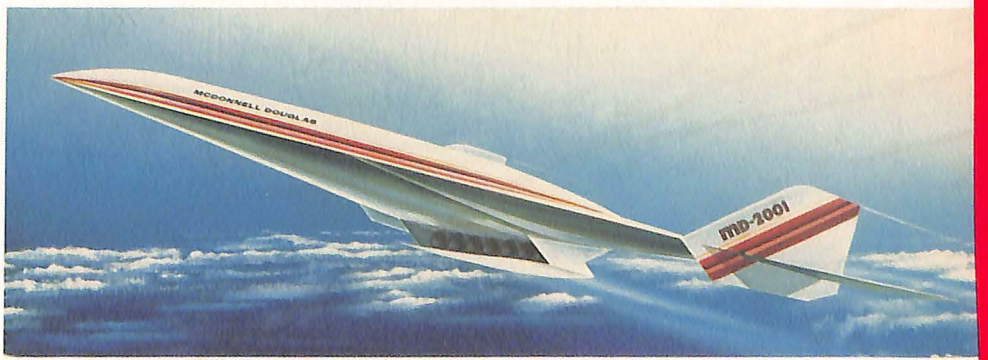


A milestone in the Strategic Defense Initiative Brilliant Pebbles program, intended to develop an interceptor capable of destroying ICBMs, was the June verification test of Aerojet's Divert Attitude Control System.

In research for the National Aero-Space Plane (NASP) program, Textron Specialty Metals developed a NASP fuselage assembly made of silicon carbide reinforced titanium.

- The Advanced Launch System, a joint NASA/Air Force program for a new heavy lift launch vehicle. DoD contractors for vehicle design and technology demonstrations include Martin Marietta and McDonnell Douglas working as a team, Boeing Aerospace, and General Dynamics. NASA contractors for propulsion technology are Aerojet, Pratt & Whitney, and Rockwell Rocketdyne.

In January General Dynamics, McDonnell Douglas, Pratt & Whitney, and Rockwell's Rocketdyne and North American Aircraft divisions announced their intention to form a contractor team to develop the National Aero-Space Plane (NASP). Pictured is a McDonnell Douglas concept of the experimental NASP.



eptember McDonnell
glas marked the 10th
iversary of the first
80 delivery. In
elopment was the
90-30, an MD-800
vative.

ASF Structural Materials'
arbon fibers were being
roduced for increased
trength and reduced
eight in a number of
ommercial aircraft,
cluding the Beech
arship pictured.

In production by Pratt &
Whitney: the PW 2000
series of engines (center page),
power plants for the Boeing
757 and the USAF C-17.

CIVIL AVIATION

Spurred primarily by growth in international travel, U.S. scheduled airlines boarded a record 467 million passengers in 1990, according to preliminary data provided by the Air Transport Association. However, the industry appeared headed for an all-time record loss of $2 billion, due primarily to sharply higher fuel costs in the last half of the year, occasioned by the Persian Gulf crisis.

The number of passengers boarded represented an increase of 3% over 1989. Total passenger miles, also a record at 457 billion, increased 5.7%. The number of individual flights increased 4.6% to 6.9 million.

At year-end, U.S. scheduled carriers had orders and options for jet aircraft worth more than $100 billion. More than 250 transports were scheduled for delivery in 1991, which would expand the U.S. jet fleet to 4,200 aircraft.

The world's scheduled airlines similarly experienced solid traffic growth, according to the 161-nation International Civil Aviation Organization (ICAO). The number of passengers boarded by scheduled airlines rose 3.8% to 1.16 billion, up from 1.12 billion in 1989. Scheduled passenger traffic increased by 8.3% and the load factor improved to 69.2%, up from 68.6%. ICAO's traffic summary made no mention of financial results.

In October Boeing launched a new program for development of the advanced technology B-777 jetliner.

Shown on its initial flight on January 10, the McDonnell Douglas MD-11 successfully completed its flight test program and won FAA certification in November.

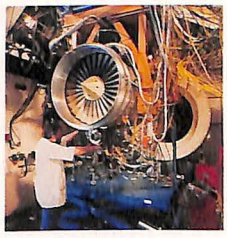
In development was GE Aircraft Engines' most powerful turbofan, a 100,000-pound thrust engine intended for future widebody aircraft.

U.S. commercial transport manufacturers enjoyed a banner year, delivering an all-time high 516 aircraft valued at $22.2 billion. That compared with 1989 deliveries of 398 planes worth $15.1 billion.

Overall civil aircraft sales—including airliners, helicopters, and general aviation aircraft—grew more than 45% to $25 billion, up $7.9 billion over 1989. Manufacturers shipped 2,366 aircraft, down from 2,448 in 1989.

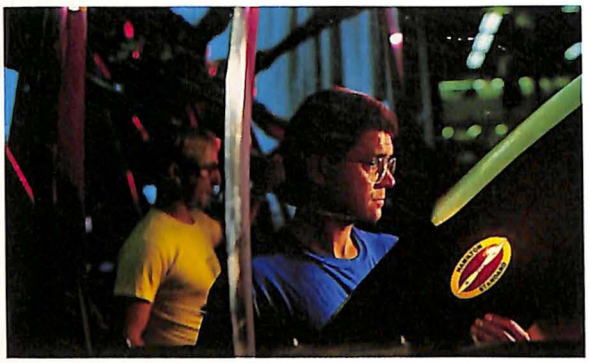
Shipments of civil helicopters reached an eight-year high of 570 units, but sales fell to a 16-year low of $247 million. This was due to a shift in the composition of industry sales from large, high-value, turbine-powered models to smaller, less expensive piston-powered models. By contrast, general aviation manufacturers shipped 255 fewer aircraft than in 1989 for a total of 1,280, but sales increased by 39% to $2.5 billion.

For 1991 Aerospace Industries Association projected deliveries of 600 transports worth $27.6 billion and overall civil aircraft sales of more than 2,500 units valued at $30.3 billion.



Garrett Engines Division of Allied-Signal Aerospace was producing the GE/Garrett CFE738 engine for the French Falcon 2000 business jet.

At right, a Hamilton Standard technician moves a 14SF all-composite propeller blade to final assembly. Jointly with a French company, Hamilton Standard will supply the blades for the new French/Italian ATR-721 regional transport.



Undergoing test in 1990 was Williams International's FJ44 turbofan, a joint venture with Britain's Rolls Royce. Two FJ44s will power the Cessna CitationJet, business aircraft, scheduled for first flight in March 1991.

Pyromet Industries, a division of Ontario Corporation, employs laser holography for aircraft engine inspection.

Undergoing certification testing at year-end, McDonnell Douglas Helicopter Company's MD530N was scheduled for initial deliveries in mid-1991.

At the end of the third quarter of 1990 (latest date for which detailed figures are available), Boeing Commercial Airplane Company had a backlog of 1,502 aircraft on order. The largest segment of the backlog—803 aircraft or more than half the total—was in orders for the short-to-medium range twin-jet B-737. Boeing also had orders for 319 B-757s, 201 B-747s, and 179 B-767s.

In February Boeing received Federal Aviation Administration (FAA) certification for the new B-737-500 and deliveries started in March. In October Boeing launched the B-777, a twin-engine, widebody transport that the company intends to be the first of a new family of airliners. The 390-passenger plane was scheduled for first delivery in mid-1995.

McDonnell Douglas Corporation's Douglas Aircraft Company had a September 30 backlog of 605 units, including 432 of the MD-80/MD-90 series of twin-engine transports and 173 orders for the new MD-11 tri-jet. The MD-11 began its flight test program in January and, after 10 months of testing, received its FAA certification, clearing the way for initial deliveries late in the year. Douglas was planning to launch an MD-11 derivative, known as the MD-12X, in 1991; a stretched version of the MD-11, it would have a new wing for increased aerodynamic efficiency.

In development and planned for initial deliveries in 1994 was the MD-90-30, a 153-passenger derivative of the MD-80 twin-jet transport. Douglas was planning three other versions of the MD-90 with seating capacities ranging from 114 to 180. The company was also studying an advanced twin-aisle aircraft—the MD-XX—that would seat 200 and have transcontinental range.

In the rotorcraft segment of the industry, McDonnell Douglas Helicopter Company's MD530N light helicopter was undergoing certification tests, with initial deliveries planned for mid-1991. The MD530N is a production version of the company's experimental NOTAR (No Tail Rotor) craft.

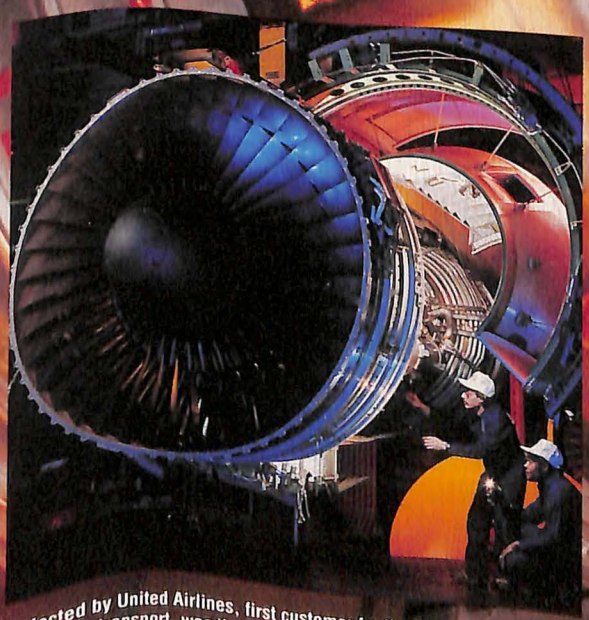
In development at Boeing Helicopters was the Model 360 Advanced Technology Helicopter, which features an all-composite fuselage, advanced cockpit electronics, and new high-speed airfoils. One of the fastest rotary-wing aircraft, it has a maximum speed of 235 knots and has flown at 214 knots; the official speed record is 217.4 knots. The Model 360 development was undertaken primarily as a test facility for the latest advances in design and manufacturing technology; some of the technology developed has been incorporated into Boeing's CH-46 and MH-47E military helicopters.

Beech Aircraft Corporation, a subsidiary of Raytheon Company, made the first flight of its 1900D 19-passenger regional airliner in March. Flight tests continued throughout 1990 on schedule for certification early in 1991 and customer deliveries in mid-1991. Beech also received FAA certification for its Beechjet 400A business aircraft and planned to start deliveries before year-end. The 400A is an advanced version of the Beechjet 400 with improvements in performance, allowable weight, cabin volume, and seating capacity.

In November British Aerospace conducted a U.S. demonstration tour of its Advanced Turboprop (ATP) regional airliner. Two United Technologies divisions are participating in the ATP development and production program: Pratt & Whitney supplies the PW126A engines and Hamilton Standard and British Aerospace are jointly producing new generation, six-bladed propellers.

(Center) Undergoing ground test in 1990 and scheduled for FAA certification in 1992 is the CFM56-5C2, newest model of the CFM56 family produced by CFM International, a joint venture of General Electric and France's SNECMA.

In development and flight test was the Boeing 360 Advanced Technology Helicopter, which features an all-composite fuselage and advances in avionics and airfoils.

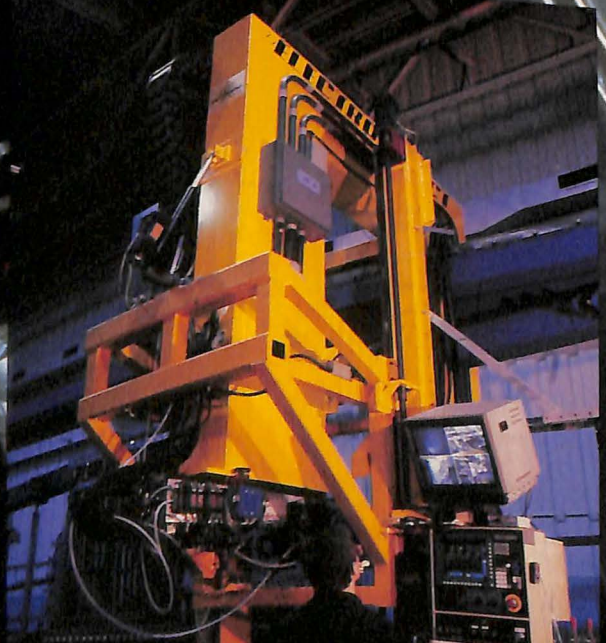


Selected by United Airlines, first customer for the Boeing 777 widebody transport, was the Pratt & Whitney PW4073 engine.

Precision Castparts Corporation completed and began operating a computer-controlled Master Caster melting furnace that permits manufacture of large castings for commercial jet engines not earlier possible.

Beech Aircraft received FAA certification for its Beechjet 400A, an improved version of the Beechjet 400.

In September Lockheed Aircraft Service Company introduced a new line of solid state flight data and cockpit voice recorders.



Textron Aerostructures introduced an impact riveter system to speed assembly of wing components for the Airbus A330/A340 program.

Rohr Industries became the first manufacturer licensed to use a new, Lockheed-developed, resin-seal process that protects metal parts from corrosion.

In March Beech Aircraft Corporation made the first flight of its 1900D 19-passenger regional airliner.

In civil aviation research, NASA concluded its three-year High Speed Civil Transport study program on candidate second generation supersonic transports; Boeing Commercial Airplane Company and McDonnell Douglas conducted the studies. In 1990 NASA embarked on a second-phase High Speed Research Program that will focus on noise, sonic boom, aircraft economics, and the environmental acceptability of a successor to the Anglo-French Concorde. Boeing and McDonnell Douglas continued to work on the program, under NASA contract and independently. General Electric Aircraft Engines and Pratt & Whitney announced a cooperative effort to develop advanced engine and materials technology.

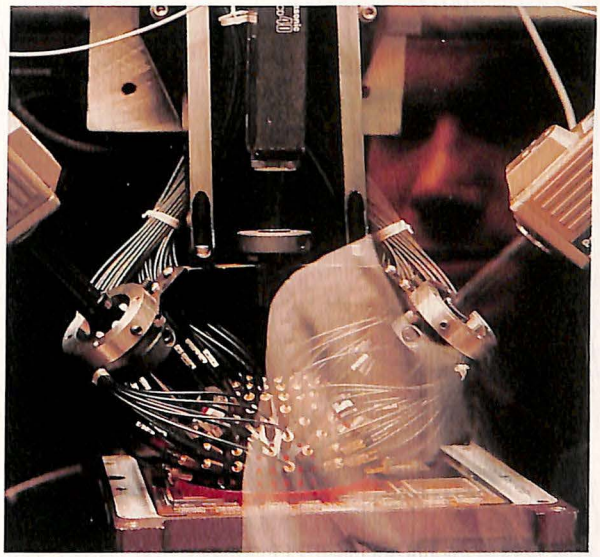
In May in a related development, Boeing, McDonnell Douglas, Daimler-Benz Deutsche Airbus, Aerospatiale, and British Aerospace agreed to study jointly the potential and problems of bringing an advanced supersonic transport to market.

In other NASA activity, the agency continued to study the civil potential of the tiltrotor aircraft and initiated, jointly with FAA and The Boeing Company, a Phase II study. Additionally, NASA announced plans to conduct 1991 wind tunnel tests of an advanced tiltrotor designed by Sikorsky Aircraft.

In November NASA started a test program on a jump-strut nose gear that forces a plane's nose up during the takeoff run to cut takeoff distances as much as 12%. The jump strut was developed by Coltec Industries' Menasco Aerosystems Division as part of a joint NASA/USAF research effort. It will be tested on Ames Research Center's Quiet Short-Haul Research Aircraft, a modified DeHavilland Buffalo.

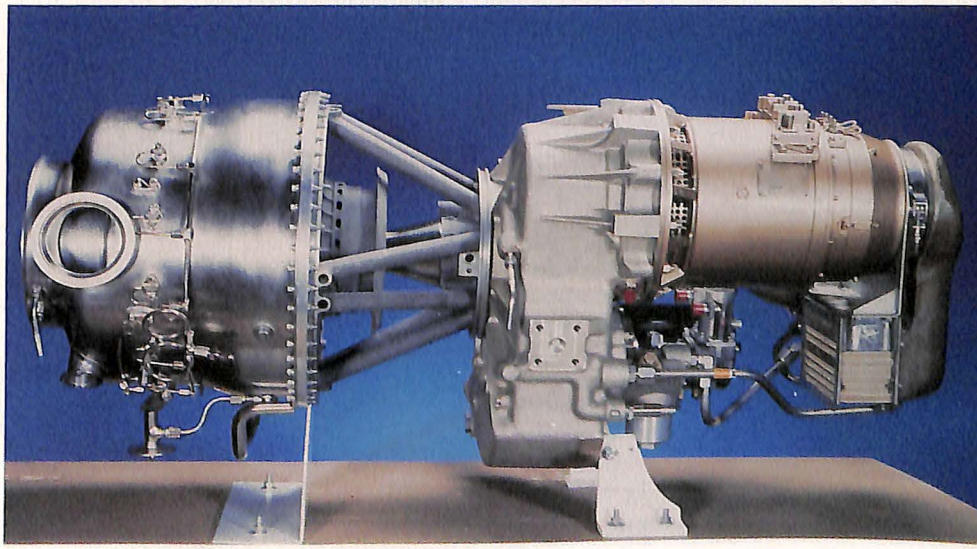
Also in November, NASA's Langley Research Center and Honeywell Inc.'s Space Systems Group concluded a joint research project intended to improve automated landing capabilities of aircraft. The program involved 36 automated landings of Langley's Boeing 737 research airplane using a Honeywell integrated differential navigation system linked to the Air Force's Global Positioning System, a network of satellites for precision navigation.

Westinghouse Science & Technology Center developed a three-inch gallium arsenide wafer that contains 16 complete radar transmit/receive cells.



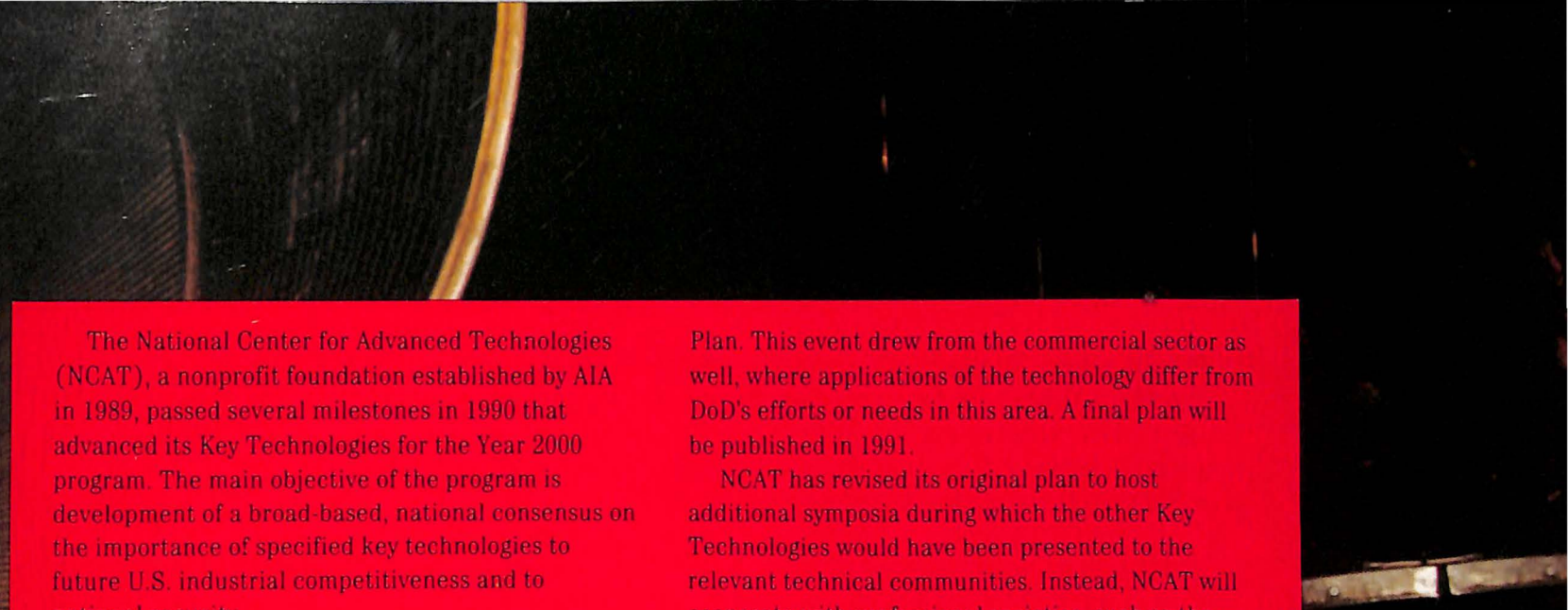
(Left) For automated inspection of solder joints, Westinghouse Electric Corporation introduced the Structured Highlight Inspection System, which inspects solder connections too small for the human eye to discriminate at the rate of 7,200 per hour with 100% reliability.

(Below) Auxiliary Power International Corporation, a joint venture of the U.S. Sundstrand Corporation and the French Labinal Inc., introduced to the commercial market the APS 2000 Auxiliary Power Unit used in the Boeing 737 and McDonnell Douglas MD-80 series.



National Center for Advanced Technologies

(Left to right) John M. Swihart, President, NCAT, and George P. Millburn, Executive Vice President, NCAT



The National Center for Advanced Technologies (NCAT), a nonprofit foundation established by AIA in 1989, passed several milestones in 1990 that advanced its Key Technologies for the Year 2000 program. The main objective of the program is development of a broad-based, national consensus on the importance of specified key technologies to future U.S. industrial competitiveness and to national security.

In 1990 NCAT initiated contact with other trade associations and professional societies to develop awareness of emerging technologies beyond aerospace. It also assisted the White House Office of Science and Technology Policy (OSTP) in developing its list of 30 National Critical Technologies and worked with the Department of Defense (DoD) on its Critical Technologies. Five of AIA's Key Technologies—Advanced Composite Materials, Advanced Sensors, Optical Information Processing, Airbreathing Propulsion, and Superconductivity—were so closely identified with DoD's Critical Technologies that NCAT and DoD agreed to work together on development plans.

A roadmap for Advanced Metallic Structures—the most recent addition to the Key Technologies list—is under development. Eventually this technology and Advanced Composites will be merged into a national plan for Advanced Materials and Structures.

Symposia Activity

NCAT sponsored two major symposia in 1990. At the Rocket Propulsion Symposium in February, 200 technical specialists from industry, government, and academia reviewed and discussed a draft National Rocket Propulsion Strategic Plan. The final plan, published in August, is the first technology development plan produced by any group that represents a national consensus. Approximately 1,000 experts from the total U.S. rocket propulsion community were involved in the process.

Results were positive: Congress authorized additional funds for the NASA budget, and the Air Force Ballistic Missile Office is following the guidelines in the rocket propulsion technology plan in its research and development program.

Attendees at a December 11 and 12 symposium reviewed the draft Advanced Composites Strategic Plan. This event drew from the commercial sector as well, where applications of the technology differ from DoD's efforts or needs in this area. A final plan will be published in 1991.

NCAT has revised its original plan to host additional symposia during which the other Key Technologies would have been presented to the relevant technical communities. Instead, NCAT will cooperate with professional societies, such as the American Institute of Aeronautics and Astronautics and the Institute of Electrical and Electronics Engineers, in presenting national strategic plans to technical audiences. The next NCAT symposium, planned for September 1991, will focus on policy matters and OSTP's National Critical Technologies.

Aerospace Technology Policy Forum

The Aerospace Technology Policy Forum consists of key policy makers from industry, government, and academia. It met on three occasions in 1990 to review and propose policies related to cooperative research and development, explore strategic technology requirements, review Key Technologies plans, advise NCAT on its national consensus approach, and discuss ways to improve cooperation among DoD, OSTP, and NCAT in overlapping areas.

Future Plans

The Key Technologies for the Year 2000 program represents the first time national technology development plans have been produced that can truly be called consensus plans. The program's success is due primarily to the volunteer efforts of industry with significant cooperation and support from government laboratories and the university community.

In 1990 President Bush signed legislation to establish a Critical Technologies Institute (CTI) to support OSTP in ways essentially identical to the objectives of NCAT. With a demonstrated process for producing technology development plans, NCAT can play a major role in 1991 by supporting OSTP and CTI in identifying national critical technologies, creating their development plans, and, most importantly, monitoring their implementation.

See also page 63.

AEROSPACE RESEARCH CENTER

The Aerospace Research Center researches, provides analysis, and prepares studies to bring perspective and a broader understanding to the issues, problems, and policies of the industry.

At year-end the Research Center had completed the draft of *U.S. Aerospace Industry: A Global Perspective for the 1990s*. The paper is a follow-on to the 1988 study, *The Aerospace Industry and the Trend Toward Internationalization*, that describes fundamental structural and market reasons for increased international cooperation by industry.

Since then, significant changes in the aerospace international marketplace have occurred, many of them heightened by political events. And although the pace of change has picked up and international cooperation continues, is the marketplace developing as anticipated?

The new AIA report addresses the following questions:

- What advantages and disadvantages does the U.S. aerospace industry have as it faces increased competition in the global marketplace?
- What developments are shaping two major regional markets: Europe and the Pacific Rim?
- What will be the effects of the exponential dispersal of technology around the globe, and how will U.S. technology policies affect the market viability of American companies?
- What strategies should U.S. companies and the U.S. government follow to keep the industry strong and innovative?

Publication of the study is planned for early 1991.

Market Trends

In April, the Research Center's series of information briefs, *Facts & Perspective*, began appearing in the *AIA Newsletter*. The first of the 1990 analyses, "U.S. Aerospace Market Share Declines," used European Commission data for comparison purposes. Data showed that the U.S. share of the aerospace market settled to its lowest point in 10 years after peaking in 1985. Declining Department of Defense (DoD) spending contributed to the reduced U.S. market share. Nonetheless, U.S. sales continued to grow as the world market in aerospace products and services expanded. In effect, the U.S. now has a smaller share of a larger pie as foreign competitors show increasing strength.

Asia-Pacific Rim

In the June *AIA Newsletter*, *Facts & Perspective* analyzed aerospace market trends and issues in a region of expanding opportunity: the Asia-Pacific Rim. The central issue is how best to increase already significant U.S. sales in this region while concurrently satisfying customer demands for greater collaboration in the design and production of aerospace products.

Joint ventures will undoubtedly advance industrial base development in U.S. partner countries, and the cumulative effect of such practices could create future competitors for U.S. companies. But if U.S. firms respond slowly to cooperative opportunities in this region, competitors in Western Europe and elsewhere will assuredly pursue business relationships there and gain the associated sales.

The marketplace, the analysis concluded, is moving ahead of the U.S. government's ability to formulate technology transfer and export policies.

Economics of 1990

"Economics of 1990 and the Aerospace Worker," published in the August/September 1990 *AIA Newsletter*, recapped a survey performed for AIA's Human Resources Council. The survey report summarized how a sampling of AIA-member companies addressed work force readjustments from 1983 to early 1990. It described policies and practices that eased the situation for employees and those now in place to deal with further dislocations.

Although acknowledging the difficult financial times ahead for many aerospace companies and employees, the report argued against mandated conversion policies for the industry. Instead, it called for gradual and orderly defense cutbacks, sustained levels of research and development funding, sound government financial planning, and policies to support aerospace exports. The survey report was cited in testimony on Capitol Hill and in discussions

with congressional staff as Congress considered legislation mandating certain conversion practices in industry.

Employment Trends

Research Center staff prepared an analysis on various factors influencing aerospace employment. *Aerospace Employment Trends, 1961-1990*, which appeared in the March *AIA Newsletter*, concluded that the effect of defense spending on the industry is diminishing as aerospace develops a more diversified customer base. Although defense spending has been, and will continue to be, an important factor influencing aerospace employment, other significant influences on industry employment include the increasing emphasis on exports and the health of the national economy. The report pointed out that a gradual, not abrupt, reduction of defense business is needed as military budgets decline.

Employment Survey

The Research Center released AIA's 1989 Annual Survey of Aerospace Employment in spring 1990. Company reports as of fall 1989 comprised the basis for data, which also included final figures for 1988, preliminary figures for 1989, and projections for 1990. Survey results showed the substantial changes taking place in the aerospace work force "mix." For example, in 1989, 35,000 new jobs in the civil aircraft sector offset a reported loss of 14,000 jobs in military aircraft production.

Since projections for the 1989 survey were made before the Cold War "thaw," the 1990 survey, which will be released in early 1991, will provide more realistic 1990 data. Final figures for 1989, preliminary figures for 1990, and projections for 1991 will be included.

Special Projects

Research Center staff assist with a variety of projects either conducted by AIA or by other organizations whose work relates to the industry's interests and prospects.

The Research Center assisted the Council on Competitiveness in a strategic assessment of national technology priorities and U.S. international competitiveness by helping to develop an "Aerospace Sector Profile" paper that provided an overview of the industry and described critical aerospace technologies. The center also provided information to AIA's International Council for a presentation highlighting the benefits of aerospace trade and the possible impact on defense trade of market developments in Europe and Japan.

Facts & Figures

In December Research Center staff published the 38th edition of *Aerospace Facts & Figures*, the annual statistical handbook for 1990-91. The theme—"Aerospace Manufacturing: Production for Peace and Progress"—highlights how aerospace design and manufacturing personnel work together to see that quality is built in.

Sales of the *1989-90 Facts & Figures*, managed in-house by Research Center staff, reached 1,313 copies at year-end with more than 2,000 complimentary copies distributed.

"There is nothing so likely to produce peace as to be well prepared to meet an enemy."

George Washington 1780

Year-End Projections

The annual AIA media briefing and luncheon in December includes current-year and next-year projections of industry activity, data, and analysis prepared by Research Center staff. This year, the center forecast 1990 current dollar sales of $131 billion, a 12% increase over 1989. Sales should increase to $133 billion in 1991, a decline after inflation. The 1990 industry trade balance is predicted at a record $26.1 billion.

Statistics

Research Center staff publish more than two dozen statistical series on industry trends and activity, employment, production, and trade. These are available to interested persons in industry, government, the media, and the public. DoD and NASA data on contract awards, status of funds, obligations, and expenditures are mailed to AIA-member company representatives who request them.

Research Center staff revised its trade data bank to reflect changes in the way U.S. trade statistics are being categorized since the adoption of harmonized tariff schedules. The Research Center now obtains U.S. trade data in a revised format that provides

Virginia C. Lopez
Executive Director
Aerospace Research Center, AIA

greater detail, accuracy, consistency, and timeliness and makes locating important statistical information and key data easier.

Information

Research staff—including a full-time librarian—address many data and general information inquiries from both within and outside the association.

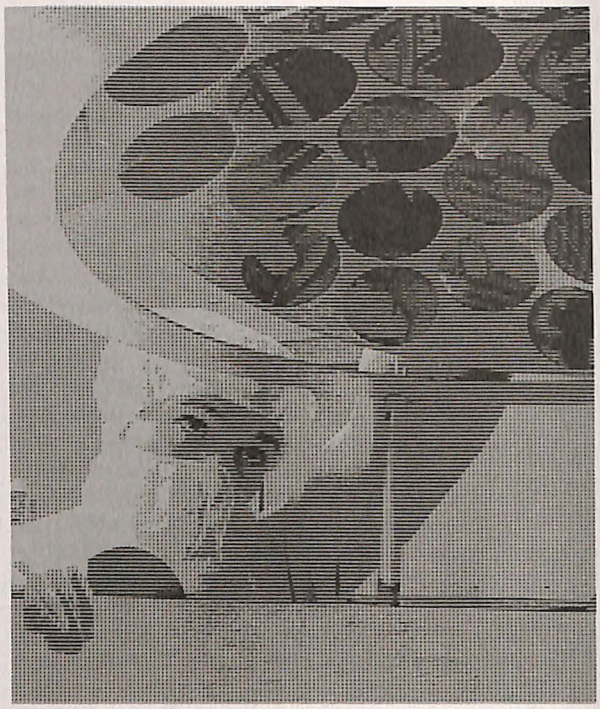
Research Center staff

- Provide background and data for speeches, media interviews, and congressional testimony.
- Meet with member company personnel, government and association representatives, and others to discuss public policy issues and industry trends.
- Represent AIA on data-related issues with government and study groups.

Surveys

The work of the association is supported by Research Center assistance with surveys. This year, surveys dealt with

- The impact of government work measurement requirements, policies, and procedures.
- The interpretation and implementation of the "organization costs" cost principle in FAR 31.205-27 as related to the unallowable cost period.
- Company policies for dealing with the impact of economic readjustment on aerospace workers.
- Member company expenses associated with information technology.
- The impact of the government's policy of recoupment of nonrecurring costs on commercial sales of defense products, derivative items, and technology.



CIVIL AVIATION

Civil Aviation works with domestic and international governmental agencies, Congress, and other organizations in the aviation community concerning manufacture of civil aircraft, including commercial aircraft, business jets, and rotorcraft.

In 1990 AIA made a deliberate, intensive effort to expand its role in the Federal Aviation Administration (FAA) rulemaking process by identifying potential problems for the aerospace industry and proposing solutions. AIA selected three FAA rulemaking activities as "demonstration projects" or models for future dealings with the FAA: 1) derivative certification basis, 2) the redesigned FAA airworthiness release tag on certain parts for export, and 3) the new FAA manufacturing audit program.

AIA commented extensively on regulatory proposals and made specific recommendations that, if implemented, would achieve FAA objectives while minimizing the burden on industry. Through these projects, AIA demonstrated its ability to formulate technically sound positions on complex issues that address the needs of government, FAA, and the industry.

Seventh Annual FAA/JAA Meeting

At the seventh annual joint meeting of the FAA, the European Joint Aviation Authorities (JAA), and industry, AIA and its European counterpart, AECMA, again encouraged authorities to cooperate and harmonize their airworthiness requirements. AIA and AECMA jointly petitioned FAA and JAA for rulemaking to harmonize transport airplane flight test requirements and encouraged unified JAA helicopter certification requirements and harmonization of engine certification requirements and noise requirements with the International Civil Aviation Organization's standards.

On October 23 AIA and AECMA followed up their recommendations with identical letters to FAA and JAA requesting that they 1) eliminate tendencies to over-regulate, 2) refrain from unilateral initiation of new rulemaking activity, 3) reduce delays in internal FAA administrative procedures for national proposed rulemaking publication and subsequent rules amendments aimed at FAR/JAR harmonization, 4) coordinate actions for meeting recommended targets for items under consideration, and 5) prepare a work schedule for updating the bilateral agreements between the United States and European countries on maintenance, noise certification, and operational matters, such as minimum equipment lists.

Aircraft Certification System Evaluation Program (ACSEP)

Industry members met with FAA representatives on several occasions in 1990 to discuss the new FAA manufacturing audit program—ACSEP. As a result, major ambiguous issues, including the scope of the audit for engineering, written language, and evaluation criteria, were clarified and resolved.

After FAA and industry working groups agreed on evaluation criteria for manufacturing, AIA took the lead in developing the statement of conditions for each of the manufacturing evaluation criteria as well as the evaluation criteria and associated statement of conditions for engineering.

Industry submitted final recommendations to FAA in July 1990 and provided a roadmap suggesting December 1991 as the effective date for the FAA Advisory Circular on ACSEP.

FAA Airworthiness Release Certificate

Under bilateral agreements between the United States and other countries, an importing country may require a certificate of airworthiness on certain parts. FAA has been working with the JAA on a standard Airworthiness Release Certificate for industry use.

AIA and AECMA reached agreement on a format for the certificate, which includes information required, coverage (that is, which parts require a tag and which do not), use of computer-generated forms and signature, and limitations on the ability of companies to delegate signature authority. This proposal was largely acceptable to the authorities.

Derivative Aircraft Certification Basis

AIA, the General Aviation Manufacturers Association, and AECMA agreed that certification and safety are not competitive issues and jointly

"No weak nation that acts manfully and justly should ever have cause to fear us, and no strong power should ever be able to single us out as a subject for insolent aggression."

Theodore Roosevelt 1905

Peter Gallimore
The Boeing Company
Chairman, Manufacturing Integrity Committee

Norris Haight
Douglas Aircraft Company
Chairman, Airplane Noise Control Committee

Paul Jodon
Textron Inc.
Chairman, Propulsion Committee

Giff Marr
Bell Helicopter, Textron Inc.
Chairman, Rotorcraft Committee

Dick Meinert
The Boeing Company
Chairman, Transport Committee

presented their opinion on this subject to authorities at the FAA/JAA/industry annual meeting in June.

Since then, AIA has been leading an industry project on derivative aircraft and certification requirements. Through working groups and a review committee, a joint industry/FAA/JAA International Certification Procedures Task Force has been addressing certification of derivative products and how later amendments would be applied to the existing fleet. We expect a final rule on Derivative Product Certification Basis by June 1991.

Unapproved Parts Task Force

In February AIA's Civil Aviation Council (CAC) authorized a project group to address the proliferation of unauthorized aircraft parts that pose a substantial threat to flight safety. At the urging of Don Fuqua and Air Transport Association (ATA) President Bob Aaronson, FAA Administrator Admiral James Busey formed a joint industry/FAA task force to investigate bogus parts. It held its first meeting in August.

AIA believes that FAA must exercise its authority to conduct on-site audits of distributors. Distributors who support AIA's position understand that the problem cannot be resolved until their inventories and records are subject to FAA audit.

Parts Manufacturer Approval (PMA)

A project group established by the CAC in February analyzed FAA procedures for approving applications to manufacture parts. Two key issues were identified.

First, FAA should apply the same standards of evaluation and testing criteria to PMA applicants as required of original parts manufacturers; on flight critical parts, it should consider the manufacturing process as well as the physical appearance of the part. Second, FAA must ensure that maximum safeguards exist for the protection of the original manufacturer's proprietary rights of design, engineering, and manufacturing techniques.

AIA's efforts resulted in the establishment of an industry-wide group, including manufacturers and operators, to work on these issues. The CAC is also coordinating with AIA's Procurement and Finance Council and Technical and Operations Council regarding related technical data rights issues.

AIA Noise Testimony

In September AIA testified on federal noise policy before the House Public Works and Transportation Committee's Aviation Subcommittee. AIA supported Stage 2 aircraft nonaddition and phase out, a federal ban on all Stage 3 operating restrictions, no increase in Stage 3 stringency requirements, and federal incentives to promote compatible land use programs.

Legislation passed at year-end linked airport funding initiatives to development of a national aviation noise policy by the Department of Transportation (DOT). The law also requires a phase out of all Stage 2 aircraft by December 31, 1999, with certain extensions until 2003. Although existing restrictions are grandfathered, no new local restrictions on Stage 3 operations will be allowed unless DOT approves.

Airplane Noise Control

The development of JAA Noise Standards (JAR 36) raised concerns about FAR/JAR harmonization on this subject as well as on the treatment of noise under bilateral agreements. AIA's Airplane Noise Control Committee worked with AECMA to support JAR 36 development and harmonization of FAR 36/JAR 36 and existing bilaterals. AIA also asked JAA for permission to participate with AECMA in developing JAR 36 and for FAA to support this request.

Commercial Customer Support

AIA Commercial Customer Support Committee activities in 1990 included 1) the International Trade in Aircraft Committee's work on the impact of aircraft leasing on product support, 2) FAA's rulemaking on its airworthiness release certificate (FAA 8130-3 Airworthiness Tag), 3) FAA Parts Manufacturer Approval, 4) identification of parts through coding, and 5) product support for aging aircraft. The committee also met in formal session with ATA representatives.

Manufacturing Integrity

AIA's Manufacturing Integrity Committee (MIC) played a leading role in 1990 in the FAA's Operation Snapshot/Aircraft Certification Systems Evaluation Program. Other areas of activity included FAA advisory circulars on Quality Assurance of Airborne Software, Manufacture of Nonmetallic Compartment Interiors, and Composite Materials and Structures; Unapproved Parts; Airworthiness Release Certificate (FAA Form 8130-3 Airworthiness Tag); Action Notice 8130-23 on the use, selection, and appointment of Designated Manufacturing Inspection Representatives at supplier locations; Advisory Circular AC21-GIDEP: Government/Industry Data Exchange Program; and DOT Procedures for drug testing of employees involved in maintenance and repair. In addition, the MIC has coordinated positions with AECMA on manufacturing certification issues and draft JAR 145, Approval of Maintenance Organizations.

Propulsion

Major projects of AIA's Propulsion Committee in 1990 covered the following subjects: bird ingestion, inclement weather, engine rotor containment, regulatory harmonization, derivative aircraft certification basis, helicopter emergency power ratings, unapproved parts, PMA, engine seizure loads, engine certification handbook, engine emissions, military engine specifications, one-engine-inoperative ratings, electronic engine controls/High Intensity Radiation Fields (HIRF), and damage tolerance design concepts for engines.

Rotorcraft

AIA's Rotorcraft Committee focused on several issues in 1990: occupant restraint in rotorcraft, rotorcraft induction system icing protection, harmonization of JAA rotorcraft airworthiness requirements, derivative aircraft certification basis, helicopter emergency power ratings, engine rotor burst, unapproved parts, PMA, helicopter instrument flight, structural fatigue evaluation, powered lift aircraft certification regulations, vertiport design guide, and crash-resistant fuel systems.

Transport Committee

The list of 1990 projects undertaken by the AIA Transport Committee includes aircraft cabin fire safety, lightning effects on aircraft systems, HIRF, de/anti-icing fluids, worn brakes, accelerate/stop (rejected take-off) performance, regulatory harmonization, derivative aircraft certification basis, airplane crashworthiness, evacuation systems, structural loads and flutter, computerized airplane flight manuals, cargo unit load devices, galleys, structures, and flight manual approvals by Designated Engineering Representatives.

Ken Rosen
United Technologies Corporation
Chairman, Rotorcraft Advisory Group

Dale Warren
Douglas Aircraft Company
Chairman, Civil Aviation Council

Omar Winter
Sundstrand Corporation
Chairman, Commercial Customer Support Committee

Robert E. Robeson, Jr.,
Vice President, Civil Aviation, AIA

COMMUNICATIONS

Communications supports the public activities of AIA's president and staff and conveys industry goals and accomplishments to AIA members, the news media, and the public.

AIA's Top Ten Issues were the focal points for the three functional areas of the Communications Office: media relations, member relations, and editorial products. As the primary industry spokesman, AIA President Don Fuqua is the point person for the association's issues and communications activities.

The apparent end of the Cold War and the vigorous national debate over the downsizing of the defense budget, while providing a different focus to communications activities, did not change Fuqua's role. He continued to be an active and much requested speaker, delivering 20 major speeches in 1990 and participating in more than 40 news media interviews.

AIA initiated a program with the U.S. Chamber of Commerce for a television series of 12, one-minute commentaries by Fuqua on important aerospace issues. They began airing in September 1990 and will continue through September 1991. *Nation's Business Today* reaches a nationwide audience of opinion leaders in government and business and on Wall Street. It is an additional vehicle for AIA to communicate its message on important industry issues to the public. Copies of the spots, which included such topics as the so-called peace dividend, the preservation of the defense industrial base, and U.S. technological leadership, are available on videotape.

Fuqua also drew media attention from his appointment to President Bush's Advisory Committee on the Future of the U.S. Space Program, chaired by Martin Marietta Chairman and CEO Norman R. Augustine, who is also a member of AIA's Board of Governors. Additional exposure through *AIA Newsletter* columns, news media breakfasts, congressional briefings, and 67 articles quoting or citing him further established Fuqua as a leading industry spokesman.

Approximately 400 people, including 150 members of the press corps and 50 public affairs representatives from government agencies, attended the association's 26th Annual Year-end Review and Forecast Luncheon on December 12. In addition to the traditional year-end statistical report, Fuqua discussed the contribution made by the aerospace industry in bringing about a thaw in the Cold War, the importance of international sales to our industry, and the necessity of strong government policies to assist the industry to obtain greater sales of defense equipment in the international marketplace.

Media Activities

AIA remained an important source of information on the aerospace industry to the news media. Media interest in 1990 focused largely on industry's adjustment to a changing defense environment. Communications also responded to numerous inquiries about how Operation Desert Shield affected the industry and about international arms sales in general.

Various AIA departments requested media support during the year. Communications issued news releases promoting the National Center for Advanced Technologies' symposiums on rocket propulsion and advanced composites technology and announced the appointment of Dr. George Millburn as NCAT's executive vice president. At a press breakfast in November, AIA introduced Millburn to the press. Ongoing association initiatives, such as subcontract awards to Small Disadvantaged Businesses, received attention from Communications staff. News releases on industry statistics produced by the AIA Research Center were periodically distributed to media nationwide.

Communications provided spokespersons on key industry issues, such as acquisition streamlining and other procurement matters, the defense industrial base, the internationalization of the industry, export policy, and technology development. In 1990 we responded to more than 750 inquiries, arranged 200 staff interviews, and issued 41 news releases. Most importantly, media coverage of the association, its activities, and its message was fair and positive.

Member Relations

AIA continued meeting with leading spokesmen from the Department of Defense (DoD), the military services, and other government departments and

agencies. Washington-based public relations representatives from AIA-member companies met during the year with Brigadier General Charles McClain, Army chief of public affairs, Rear Admiral Brent Baker, Navy chief of information, and Colonel Ed Robertson, Air Force director of public affairs. Pete Williams, assistant secretary of defense for public affairs, addressed the spring meeting of AIA's Communications Council.

"Communicating in a Changing Industry" was the theme for the Fall 1990 Communications Council meeting in San Diego, California. Members were briefed and participated in discussions on major industry concerns: environmental activities, the downsizing of the defense industry, nuclear free zones initiatives, and industry's role in education.

Among the notables making presentations were William B. Allin, district manager of government relations for AT&T and chairman of the executive committee of a citizen/business group that campaigned against the 1990 nuclear free zone initiative in Alameda County, California; Dr. Robert DeVries, California State University, on the teacher training partnership between Rockwell International and California State University; Dr. Robert Biller, vice president of external affairs, University of Southern California, on public relations approaches to communicating the importance of the Space Exploration Initiative; and Richard Barnard, executive editor of *Defense News* and *Space News*, on how cuts in defense spending will affect aerospace companies and how the industry can better communicate its message to the media.

Members also heard from a panel of financial analysts on the "Downsizing of the Defense Industry: Where is the Industry Headed?" Lawrence Harris of Bateman Eichler, Hill Richards, Inc., Robert Paulson of McKinsey & Company, Inc., and Michael Rich of the Rand Corporation were the panel members.

Annual meetings of member company speechwriters and contributions managers had similar themes. The 1990 Contributions Roundtable met in Washington in October and heard presentations by AIA staff on environmental issues, the downsizing of the defense industry, and minority-related issues. Richard Fusco of the United Way of America sparked discussions of company strategic philanthropy and education. At the December Speechwriters Roundtable, AIA staff briefed attendees on activities in the international and environmental arenas. Two officials from NASA's Office of Aeronautics, Exploration, and Technology described the agency's aviation programs and the future of the Space Exploration Initiative.

Two Communications Council task groups remained active in 1990. The AIA/EIA (Electronic Industries Association) Local Initiatives Task Group, formed in November 1989, pursued a strategy of talking to pertinent federal government agencies on the preemption of Nuclear Free Zones (NFZs) based on constitutional arguments. Many AIA-member companies were active in a coalition that successfully countered NFZ ballot initiatives in California. As appropriate, AIA provided information to its members about upcoming ballot initiatives.

In March the NFZ issue received public exposure when proponents of NFZ measures released AIA memoranda and background materials that had been sent to them anonymously. AIA President Don Fuqua responded to numerous media inquiries and reiterated the industry's opposition to NFZ measures on constitutional grounds. The "Focal Point" of the May *AIA Newsletter* responded to the statements made by the NFZ proponents and elaborated AIA's position.

The Washington Public Relations Representatives task group completed its task of examining and compiling DoD and service security review policies for news releases, speeches, technical papers, photography, displays, and exhibits for trade shows. The group's efforts resulted in the publication by AIA of the *Security & Policy Review Handbook* in October 1990. John Booth, an expert from TRW, wrote the handbook, which is the first comprehensive document on the subject and carries the endorsement of DoD's director of freedom of information and security review. More than 2,000 copies were distributed to DoD and AIA-member companies. Initial reaction both within DoD and AIA-member companies was very favorable.

The adoption of education as an AIA "top ten" issue for 1990 by AIA's Board of Governors prompted the formation of the education task group. In May 1990 the group made recommendations to the

"Our country represents nothing but peaceful intentions toward all the earth, but it ought not to fail to maintain such a military force as comports with the dignity and security of a great people."

Calvin Coolidge 1925

Communications Council and later to the AIA Board of Governors on how AIA could address the problems and solutions related to the education crisis in science and mathematics in the United States.

AIA Videos

Distribution of AIA's 21-minute, educational videotape, *WINNING: Aerospace—The Next Decade*, began in early 1990. A facilitator's guide for teachers to use in conjunction with the video provides valuable career information and encourages students to enter mathematics and science-related fields of study leading to aerospace careers.

In its first year of distribution in 1990, *WINNING* achieved many successes:

- Placement of more than 200 individual tapes through targeted mailings and advertisements in the *AIA Newsletter*.
- Use by several AIA companies in their education relations programs.
- Placement by NASA in its 19, nationwide Teacher Resource Centers.
- Utilization by the 60 regional and state chapters of the Civil Air Patrol (CAP). One forum for use is CAP teacher training workshops for 5,000 to 7,000 teachers each year.
- Distribution of brochures by the Training Coalition for Science and Technology Education to 530 members and local alliances.
- Display and use by the National Science Teachers Association at its April 1990 national convention.
- Translation into Spanish by NASA.
- Placement at many U.S. universities, including Embry-Riddle Aeronautical University and California State University, as well as many middle schools.
- Centerpiece of articles in several education and aerospace publications, including *Science Teacher, Aviation and Space Education* newsletter, *Partnerships in Education Journal and Science Activities*, and *Aviation Week and Space Technology*.

The Communications Office made good use of a second videotape, *AIA...In Perspective*. It proved to be a valuable communications tool for AIA's membership development and retention program. Copies were sent to AIA-member company representatives and members of the Communications Council for use within their companies. Other AIA staff used the videotape at council and committee meetings.

The 10-minute video orients potential members and other audiences not familiar with AIA or its programs and the benefits of membership. It contains footage of the industry and comments from members of the AIA Executive Committee and AIA vice presidents on activities related to AIA's key issues. The videotape is accompanied by a brochure, *Aerospace Leadership for the 1990s*. AIA will update the videotape and brochure in 1991.

Editorial Products

- ***AIA Newsletter.*** The *AIA Newsletter* is a 12-page, issues-oriented newsletter focusing on generic, noncompetitive topics of interest to the aerospace industry. It continued to gain stature and readership since the first issue was published in June 1988. Organizations both within and outside of AIA regard it as an important informational tool on industry developments and issues. Articles were quoted or reprinted in various trade publications and member company publications throughout the year.

Communications distributes more than 14,000 copies, 10 times a year, to AIA members, Congress, universities, government agencies and departments, financial institutions, and various news media nationwide.

Don Fuqua's monthly column—"Washington Pipeline"—addressed important policy issues, such as the declining defense budget, the *Defense Management Report*, quality, the Space Exploration Initiative, detente and defense exports, the Ethics Reform Act, civil aviation, and the importance of preserving the aerospace and defense industrial base.

In addition to three focused issues (education in Jan/Feb, international in July, and civil aviation in October), lead articles covered the Clean Air Act, procurement integrity, nuclear free zones, the environment, global competition, ethics, concurrent engineering, and the SDB Mentor-Protege Program. A new feature to support AIA's concern for the environment—"Aerospace and the Environment"—relates innovative examples of AIA-member company

Jack Boyd
Martin Marietta
Chairman, Communications Council

Herbert E. Hetu
Vice President, Communications, AIA

environmental programs. Boeing, Pratt & Whitney, General Dynamics, and Hercules were featured on the environmental page.

- ***Key Speeches.*** *Key Speeches*, published 10 times yearly, is a collection of speeches by industry and government leaders on aerospace-related topics. It provides valuable background information on important topics and reflects subjects uppermost in the minds of industry executives and government policy makers.

The full texts of 36 speeches and 14 speechbriefs were published in 1990. Fifteen AIA-member companies were represented in this publication: Aerojet, Boeing, FMC, General Dynamics, General Electric, Hughes, Lockheed, Martin Marietta, McDonnell Douglas, Unisys, United Technologies, Sikorsky Aircraft, Raytheon, Allied-Signal, and Westinghouse. President Bush and Vice President Quayle along with speechmakers from NASA, DoD, the Air Force, the Defense Science Board, the Joint Chiefs of Staff, and the Environmental Protection Agency represented the government point of view on key issues. Cumulative indexes are maintained for both *Key Speeches* and the *AIA Newsletter*.

Distribution is approximately 4,000.

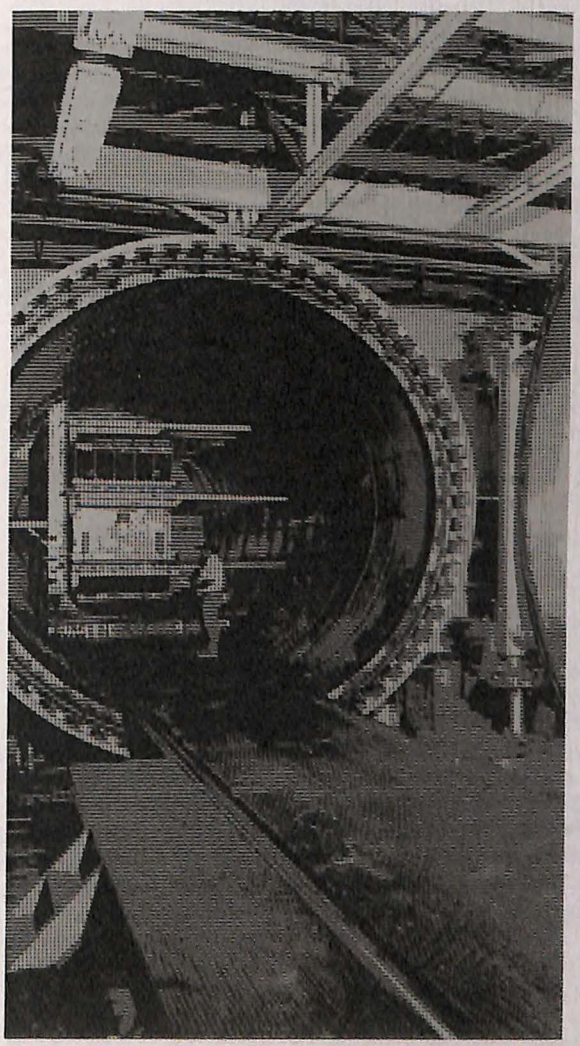
- ***1989 Annual Report.*** AIA's Key Technologies program was featured in the *1989 AIA Annual Report* with text and specially created artwork for each of the key technologies. A yearbook and year-end report on the industry and AIA activities, the report features a full-color industry highlights section and a section that summarizes AIA programs, activities, and initiatives undertaken by AIA committees and councils during the course of the year. As such, the report is an important historical document of technology and policy developments in the industry.

This year—for the first time—Communications typeset and formatted approximately 70% of the 1989 report in-house via the desktop publishing system. This resulted in a reduction in cost from the previous year while using a higher paper grade and increasing the press run by 500 copies.

Four thousand copies were distributed to select media, various education and financial organizations, appropriate governmental organizations and officials, and AIA members. The annual report is a marketing and public relations tool that was used throughout the year to spotlight the accomplishments of the industry, convey the industry point of view, and promote membership in the association.

Other Editorial Products

The installation of a second desktop publishing system and software upgrades enabled the Communications department to undertake additional publishing activities in 1990—from small-scale projects, such as fact sheets, to the *AIA Member Company Product Directory*, the *Security & Policy Review Handbook*, the AIA membership brochure, the conference brochure for AIA's International Council, and the weekly AIA staff internal newsletter—*Preview*.



HUMAN RESOURCES

Human Resources deals with labor relations, industrial security, employee compensation, occupational safety and health, and the environment as related to the aerospace industry.

Compensation Practices

- **Executive Compensation.** The 1990 participant reports and executive summary reports for nonparticipating members in the AIA-sponsored *Summit Survey of Executive Compensation* were distributed on schedule.

As in 1988 and 1989, *Summit Survey* results showed that, between defense and commercial (that is, nondefense) participants, there is no evidence that one industry group's pay patterns differ significantly from another's, even though the sample of companies in both groups continues to increase annually.

This year 64 companies participated in contrast to 55 participants in 1989. Forty of the 64 were identified as primarily commercial, 24 as primarily defense. In 1991 we will attempt to even out participation at about 40 each for commercial and defense.

AIA members comprised slightly more than one-half of this year's participants. Once again, we are making a special effort to encourage all AIA members to participate. Our members have long recognized the need for reliable survey data that objectively compares defense and commercial pay levels for key executive jobs. Thus, the report has become especially useful in preparing for Defense Contract Audit Agency (DCAA) audits of executive compensation practices as well as substantiating executive compensation recommendations made to corporate compensation committees and boards of directors.

One area we will look at closely over the next year or two is the current criteria for defining "primarily defense" companies. When appropriate, the criteria will be fine-tuned to reflect changes taking place in the defense industry because of budget reductions.

- **AIA/DCAA Interface.** Based upon previous successful meetings with DCAA headquarters and regional staff, AIA is planning a 1991 seminar similar to one held in September 1989. Its purpose will be to continue exploring compensation areas of agreement and disagreement between DCAA and the contractor community.

Items that could be covered include the definition of compensation offsets, imposition of disallowances based upon collective bargaining agreements (the government's Confession of Judgment in the Lockheed case), consideration of company executives as a class of employees in lieu of individual analysis, the 25% deviation from survey rates for determining reasonableness of executive compensation, and DCAA's continued use of invalid survey data during compensation audits.

Industrial Security

Since the November 1989 meeting between National Security Advisor Brent Scowcroft and an AIA delegation consisting of Don Fuqua, Norm Augustine, chairman and CEO of Martin Marietta, and Harry Volz, director of security for Grumman Corporation, the concept of a single National Industrial Security Program (NISP) has been embraced by the entire industrial security community. Both industry and government support has been widespread and growing.

In May 1990 President George Bush signed the National Security Review directing Secretary of Defense Dick Cheney to coordinate with the secretary of energy and the director of central intelligence in studying the feasibility of implementing a NISP. Industry assisted in the response to the president.

After coordination review by the secretaries of state and treasury, the attorney general, and the chairman of the Nuclear Regulatory Commission, the report was completed and forwarded to President Bush under an October 17 cover letter signed by Deputy Secretary of Defense Donald J. Atwood (as acting secretary of defense), Secretary of Energy Admiral James D. Watkins, and Director of Central Intelligence William H. Webster.

Quoting from the cover letter, "This report indicates that changes in the management and organization of industrial security programs are necessary. The government can reduce costs through the standardization of industrial security policies and procedures. Using the creative talents of the

private sector to assist in the development of cost-effective security standards, we should be able to improve the security of our most sensitive information and technologies.

"The globalization of industry, coupled with increased economic competition and the dramatic strategic developments in East-West relations, will lead to new and different threats from both old and new adversaries. We agree that now is the time for a collective effort by government and industry to establish the single, integrated and cohesive security program needed to protect our economic interests and preserve our technological position of leadership."

The full report emphasizes the need for standardization and consolidation of security requirements and activities through a single set of integrated baseline standards to protect classified material, including the application of more stringent, consistent measures only after formal justification of need. The report also addresses 1) the need for, and the efficiency gained from, uniform personnel security requirements and security awareness programs, 2) reciprocity among government agencies in accepting each other's security facility accreditations, inspections, and personnel investigations, and 3) a uniform, reciprocal set of inspection and reporting requirements and methods among government agencies and industry.

The cover letter commits to forming an interagency task force to develop implementation plans for various elements of the NISP. We expect that the task force will 1) focus on program criteria and resource management in order to improve administration and ensure security cost effectiveness, 2) establish security standards and procedures to eliminate duplicate operations, 3) set up a centrally directed industrial security system for oversight and compliance, and 4) develop a program for early detection of potential espionage candidates.

The letter also points out that it is important to use the creative talents of the private sector and that the program is a collective effort by government and industry. Thus, we expect government and industry will cooperate over the next year in several areas: 1) conducting a regulatory review to reduce unnecessary requirements, 2) developing uniform, standardized security policies for all protection programs, 3) establishing a mechanism for determining complete industrial security costs, and 4) ensuring completion of personnel security initiatives, such as a single-scope background investigation.

Organizationally, the report recommends putting the NISP under the direction of the assistant to the president for national security affairs. The secretary of defense would be designated the executive agent and would coordinate with the secretary of energy and the director of central intelligence and seek the full participation and assistance of industry.

The report to the president emphasizes that the NISP must be a truly national program, and, for this reason, industry is advocating that it be established by executive order to solidify its national program standing.

Legislative Issues

- **Civil Rights Act of 1990.** Because of a presidential veto, which was sustained by the Senate, the Kennedy/Hawkins (S. 2104/H.R. 4000) "quotas-litigation" bill failed to become law. AIA joined with more than 240 companies and associations in a coalition opposing some of the more onerous aspects of this proposal: compensatory and punitive damages that could run into mega-dollar awards, jury trials in Title VII cases where "intentional discrimination" or "callous indifference" is alleged, and pressure on employers to use quota hiring and promotion procedures in order to avoid litigation.

None of these concerns with the proposed law were modified enough during the debate in Congress and during congressional negotiations with the White House to make the bill acceptable to employers. The bill's proponents will likely reintroduce this or very similar legislation early in the 102nd Congress.

- **Joint Trusteeship of Pension Plans.** Under H.R. 2664 (Visclosky, D-IN), a joint board of trustees composed of equal numbers of employer and employee representatives would govern all ERISA-covered pension plans. Though the bill went nowhere in the 101st Congress, indications are that with strong labor support a serious effort will be made in

"When peace has been broken anywhere, the peace of all countries everywhere is in danger."

Franklin Delano Roosevelt 1939

the next Congress to reintroduce a similar bill. The employer community is opposed to such legislation, however, because it would adversely affect investment returns on pension plan assets, discourage the formation of new pension plans, and seriously disrupt labor-management relations.

- **Replacement of Strikers.** Three bills introduced in the second session of the 101st Congress would have amended the National Labor Relations Act to prohibit permanent replacement of strikers during any strike. H.R. 3936 (Clay, D-MO) and S.2112 (Metzenbaum, D-OH) would make it an unfair labor practice to hire, or threaten to hire, permanent replacements during a labor dispute. H.R. 1383 (Brennan, D-ME) would limit the ban to the first 10 weeks of any strike.

These proposals neither addressed an unsettled area of the law nor attempted to redress any recent issue. What they would have done is radically change a long-standing, well-established precedent in the complex arena of national labor policy that encourages prompt resolution of labor disputes. Enactment of any one of these bills would have upset the delicate balance between the rights and obligations of employers, employees, and unions carefully crafted by Congress and more precisely delineated by judiciary and National Labor Relations Board decisions during the last half century. Employers would be denied a countervailing force to employee strikes and left with no alternative but to accede to union demands.

Organized labor has identified this issue as its top legislative priority for 1991, and we expect legislative action on similar proposals early in the 102nd Congress.

Frederic M. Dustin
United Technologies Corporation
Chairman, Compensation Practices Committee

William F. Lavallee
LTV Corporation
Chairman, Industrial Security Committee

Jacqueline A. Luca
Northrop Corporation
Chairman, Occupational Safety and Health Committee

Environmental Concerns

During 1990 AIA's Environmental Affairs Committee followed and, where appropriate, commented on proposed federal environmental legislation and regulations that affect aerospace operations. Linking AIA efforts with other organizations that share our issues of concern has assisted AIA in getting timely information and has given our efforts more impact through joint responses. AIA now communicates on a regular basis with other associations and coalitions that are affected by more stringent environmental restrictions.

The aerospace industry is represented on several committees and advisory bodies at the federal level that help to set policy or to coordinate environmental efforts. Examples of such organizations include the American Institute for Pollution Prevention, the Department of Defense Chlorofluorocarbons (CFCs) Advisory Committee, and a Plastic Parts Control Techniques Guideline (CTG) Task Force that reports to the Environmental Protection Agency (EPA). AIA is working through the Council of Defense and Space Industry Associations (CODSIA) to coordinate industry responses to Department of Defense (DoD) efforts to achieve compliance with environmental laws and regulations (see the Defense and the Environment Initiative).

- **Clean Air Act.** On November 15, 1990, President Bush signed into law the Clean Air Act Amendments of 1990. The act is now the most complex, far-reaching, and one of the most costly environmental laws affecting U.S. industry. Included in the amendments is the requirement that EPA write a CTG specifically for the aerospace industry. AIA submitted a nomination in December 1990 for a seat on a new Clean Air Advisory Committee that will provide EPA with advice on policy and technical issues pertaining to the revised Clean Air Act.
- **Chlorofluorocarbons.** As part of the Clean Air Act Amendments, ozone-depleting compounds, which include CFCs and methyl chloroform, will be phased out at a faster pace than the pace agreed upon in June 1990 in the international agreement among industrialized nations. Production of methyl chloroform, a solvent important to aerospace activities, will be prohibited totally by the year 2004.

AIA met with DoD, EPA, the U.S. Chamber of Commerce, and congressional staff to explain the difficulties industry faces in finding and getting approval for chemicals to replace CFCs; nevertheless, the new regulations require that scarce resources be spent to develop alternatives to CFCs quickly.

The Environmental Affairs Committee facilitates the exchange of information among AIA members on

research and development (R&D) efforts to eliminate CFCs and on other areas of environmental R&D.

- **DoD Environmental Initiative.** Secretary of Defense Cheney issued a memorandum in October 1989 stating that the Defense Department would be the "federal leader in environmental compliance and protection." With that statement, the Defense and the Environment Initiative (D&EI) began. The purpose of the D&EI is to develop a plan to bring DoD into full compliance with all environmental laws and regulations. As the first step of the D&EI, a meeting on "Our Nation's Defense and the Environment" was held September 6-7, 1990, in Bethesda, Maryland.

AIA is the contact point for aerospace industry involvement in the D&EI. Representatives from approximately 20 aerospace companies attended the September meeting where a short paper on environmental issues of concern to the aerospace industry, prepared by AIA's Environmental Affairs Committee, was distributed. The D&EI may serve as a process in which DoD and industry can work together to solve environmental issues of mutual concern.

Occupational Safety and Health Concerns

During 1990 the AIA Occupational Safety and Health Committee was active in following proposed changes in legislation and regulations, especially those relating to ergonomics, reform of the Occupational Safety and Health Act, and tighter restrictions on exposures to lead and cadmium. In addition, the committee worked with the Suppliers of Advanced Composite Materials Association to set up task groups to identify the hazards that advanced composites or their components pose to worker safety. A testing protocol that meets the concerns of both suppliers and users of such materials is being developed.

Another task group, which reports to the Occupational Safety and Health Committee, compiled an industry-wide assessment of the prevalence, use, and safety and health practices associated with advanced composite materials. Preliminary results of the study were given at the December 1990 symposium on Advanced Composite Materials hosted by the National Center for Advanced Technologies and the American Institute of Aeronautics and Astronautics.

Under the auspices of the Occupational Safety and Health Committee, two highly successful, one-day seminars presenting an overview of the Toxic Substances Control Act were presented to AIA members during 1990.

John G. Marth
ITT Defense
Chairman, Human Resources Council

Terry J. Winder
Hercules Aerospace Company
Chairman, Environmental Affairs Committee

Daniel J. Nauer
Vice President, Human Resources, AIA

INTERNATIONAL

Patrick A. Briggs
Bell Helicopter Textron
Chairman, U.S./ Canada/Australia Committee

Jerome E. Eiler
Grumman Corporation
Chairman, International Council

Raymond Garcia
Rockwell International Corporation
Chairman, Defense Production Act Committee

Ramona B. Hazera
Northrop Corporation
Chairman, Export Controls Committee

International encourages government policies that are supportive of the U.S. aerospace industry's efforts to compete and cooperate in a global marketplace.

As the world entered the 1990s, a kaleidoscope of international events presented new challenges to the aerospace industry.

First and foremost was the apparent end of the Cold War as the Soviet Union's empire crumbled and it came under increased political and economic strain. Western Europe moved forward with plans for economic and military integration but became increasingly preoccupied with how to relate to democratizing Eastern European states. And as the year drew to a close, a United States-led coalition attempted to deal with the first large-scale, post-Cold War crisis—politically if possible, militarily if necessary.

These events, in turn, triggered a range of international questions for the aerospace industry:

- What are the implications of the Soviet Union looking for increased economic ties to the West?
- What will happen to cooperation and competition in the world's defense industries as defense budgets are slashed in the United States, Europe, and USSR?
- How should the U.S. aerospace industry respond to Pacific Rim countries wanting to increase their own aerospace activities?
- How can the United States slow down proliferation of nuclear, chemical, and biological weapons and the missiles to deliver them without imposing a massive new export control bureaucracy?

AIA International Action Plan

At the beginning of the year, the AIA International Council (IC) identified six objectives that warranted priority attention. The council formulated an action plan to accomplish these objectives, which AIA's Board of Governors approved. IC Honorary Chairman William Paul and other senior corporate executives played direct roles in briefing administration officials and congressional members on this plan. The objectives and progress to date follow:

- **Administration Policy on Defense Exports.** The Reagan administration rescinded the Carter policy of actively discouraging defense exports, but it did not replace it with an affirmative policy of its own. AIA encouraged the Bush administration to enunciate such a policy. As a first step, the State Department sent a cable to all U.S. embassies instructing them to provide the same service to defense exporters as to all other industries.

Work is underway on a possible memo from the secretary of defense to Defense Department elements and the military services about the importance of defense exports. AIA anticipates that an overall administration policy will be released early in 1991.

- **Reduction of DoD Impediments to Foreign Sales.** Working closely with the Defense Policy Advisory Committee on Trade (DPACT), AIA identified several DoD policies that, if altered, would facilitate trade. We made progress on several:

—DoD agreed to assign a specific person in the Defense Security Assistance Agency to coordinate policies on industry's use of DoD equipment for demonstrations and trade shows. A policy is being implemented to waive leasing fees for such use.

—DoD agreed to reduce the use of administrative provisos in export licenses.

—A new regulation is being drafted allowing reimbursement of reasonable charges for administering offsets in foreign military sales contracts that are not funded by the U.S. government.

—Government and industry are reviewing current policy governing the recoupment of research and development charges for defense exports.

- **Resolution of Commodity Jurisdiction Problems.** AIA, working with the Electronic Industries Association (EIA), testified before Congress and suggested language for the Export Administration Act (EAA) that more clearly defines products that should be controlled as munitions items under the authority of the Arms Export Control Act and those that are dual-use items under the EAA. We also suggested a system to resolve disputes among the agencies when disagreements over the appropriate jurisdiction for a specific product arise.

Similar language was incorporated into the EAA passed by Congress. Although subsequently vetoed by the president for other reasons, a good chance exists the same language will be included in legislation in

the 102nd Congress. Furthermore, in his veto message, the president committed the executive branch to bringing the U.S. munitions control list into greater conformity with the international munitions list administered by the Western allies under the Coordinating Committee on Multilateral Export Controls (COCOM) by mid-1991.

- **Faster Government Export Licensing.** For several years the ability of the State Department's Office of Munitions Control (OMC) to process license requests expeditiously steadily deteriorated. In this regard, in 1989 AIA gained congressional support for funding new equipment for OMC, and in 1990 AIA's International Council pressed the department to enter all requests into the licensing system within 10 days and to process most licenses within 45 days.

The State Department subsequently reorganized its licensing office under the new Center for Defense Trade and essentially adopted AIA time guidelines. We see a marked improvement in overall performance although licenses related to major systems still get bogged down in interagency reviews and further delayed while waiting to be notified to the Congress.

- **Sensible National Offset Policy.** Some members of Congress and the executive branch are pressing for more government oversight of how industry responds to demands for offsets by foreign customers. AIA sees offsets as a common practice in international trade in defense products and believes that the private sector is the best judge of whether or not a particular offset makes sense.

The executive branch reviewed its offset policy early in 1990 and requested input from the private sector. AIA responded with a policy paper reflecting a general industry consensus. The final policy tracked AIA's positions quite closely and, in essence, reaffirmed that decisions to negotiate offsets and the responsibility for implementing them are up to industry.

- **Increased Availability of Financing for Defense Exports.** AIA believes that the lack of credit for U.S. defense exports puts our industry at a competitive disadvantage with countries that do provide export financing and urged that our government design a credit guarantee scheme for such exports. The administration is exploring the possibility of requesting such a program in the FY '92 budget.

Relations with Pacific Rim Countries

Pacific Rim countries are the fastest growing market for civil aircraft. In addition, most will continue increasing their defense budgets and, at the same time, they will attempt to expand their aerospace industry. Japan is no exception. Increased sales to the region will almost certainly require greater cooperative activity between U.S. and Asian aerospace industries.

AIA and our Japanese counterpart, the Society for Japanese Aerospace Companies (SJAC), held numerous discussions, and, at year-end, we both agreed to review the obstacles that may hamper cooperative activity between Japanese and American companies, particularly each governments' treatment of technology.

Some members of Congress opposed the Korean Fighter Program (KFP) because of concerns about technology transfer. AIA supported the KFP as being typical of most defense sales to industrial and industrializing countries and, again, because individual companies are the best judge of what technology can be safely transferred without jeopardizing future competitiveness.

"If we can make it sufficiently clear, in advance, that any armed attack affecting our national security would be met with overwhelming force, the armed attack might never occur."

Harry S. Truman 1949

Europe

As Western Europe progressed toward removing impediments to trade by 1992 and further consolidating the defense industrial base, the European aerospace and defense industries responded with more mergers and new forms of partnerships. Political events in Eastern Europe, however, will certainly affect future progress towards European integration.

European trade associations and the association for European aerospace manufacturers (AECMA) seek a closer working relationship with AIA in order to increase understanding of common problems. These include dealing with nonmarket countries entering into the international aerospace market and the increasingly stringent environmental controls respective aerospace industries face. AIA will explore these issues in 1991.

Karl F. Lauenstein
General Dynamics Corporation
Chairman, Legislative Committee

James R. Nelson
Martin Marietta Corporation
Chairman, Defense Trade & Cooperation Committee

William Paul
United Technologies Corporation
Honorary Chairman, International Council

Canada

AIA continued a positive working relationship with the Aerospace Industries Association of Canada (AIAC). U.S. delegates, including Don Fuqua, participated in AIAC's annual meeting, and AIAC was represented at the International Council's annual meeting. Discussions on such common issues as offset policy and the proliferation of international air shows are ongoing.

Defense Trade

As the U.S. defense budget declines, defense exports will become increasingly important to maintaining efficient rates of production and a healthy defense industrial base. With similar reductions in the defense budgets of other industrial countries, competition for defense exports will become tougher than ever. The U.S. government and defense industry will have to work together on defense exports if the U.S. aerospace industry is to maintain or improve its market share.

AIA's Defense Trade Committee is a forum for government and industry to find common ground on these matters. To this end, AIA provides background papers for the industry representatives to the DPACT for their deliberations with the secretary of defense, the U.S. trade representative, and their staffs.

Industrial Base

AIA believes that protectionist legislation and controls on export activities, such as offsets and licensed production, are not appropriate means for assisting the industrial base. Protecting industry from international competition and denying friendly countries U.S. technology would only increase the cost of doing business in the United States and turn foreign markets over to our competitors.

Therefore, AIA opposed new reporting requirements and protectionist measures in legislation to extend the Defense Production Act. We supported language to examine specific industrial sectors that are particularly at risk in order to identify the causes of their difficulties and to formulate remedies that would increase their competitiveness.

Export Controls

The Committee on Export Controls and its various working groups pressed forward on several issues:

- **Revised International Traffic in Arms Regulations (ITAR).** Working with other trade associations and company members, AIA completed a massive review of the ITAR and presented a revised draft to the assistant secretary of state for politico-military affairs in December. This draft should assist the executive branch in preparing a much needed overhaul of the regulations.
- **Improved Relations with Customs Service.** In July AIA coordinated a roundtable discussion with Commissioner Carol Hallett and other Customs officials. Consequently, several cooperative studies were undertaken to increase understanding between Customs and industry and to accomplish regulatory changes to expedite trade without undercutting Customs' necessary enforcement functions. For example, Customs agreed to revise its procedures so that violations will be charged directly to offending divisions rather than to the corporation itself. AIA also reviewed and commented on a new *Customs Handbook* that further harmonizes Customs procedures nationwide.
- **Enhancement of the Missile Technology Control Regime.** Iraq's invasion of Kuwait further intensified the push by some congressional and executive branch officials to increase export controls on goods and technology that could be used in programs to develop chemical, biological, and nuclear weapons and missile delivery systems. AIA argued strongly that for such efforts to be effective they must be multilateral and targeted specifically to key goods and technologies.
- **Core List Review.** In response to major political and economic advancements in Eastern Europe, COCOM undertook a major revision of multilateral export controls. AIA provided technical input and comments on establishing a new core list of controlled products. In general, the administration supported AIA's recommendations to decontrol civil aircraft, hardware, and current production of commercial engines in recent COCOM negotiations.

Legislative

The AIA International Council provides a framework for companies to coordinate and combine efforts in working on international issues in Congress that affect the industry as a whole.

For example, AIA members and staff actively participated in the renewal of the EAA and Defense Production Act and supported the KFP sale in the Congress. Likewise, the committee began preparation to support President Bush when he decides on the composition of a second major sale of U.S. defense equipment to Saudi Arabia early in 1991.

Richard Ridge
General Electric Company
Chairman, U.S./ Japan Committee

Susan M. Walsh
United Technologies Corporation
Chairman, Europe 1992 Committee

Joel L. Johnson
Vice President, International, AIA

LEGISLATIVE AFFAIRS

Legislative Affairs monitors policy matters affecting the industry and prepares testimony that communicates industry's viewpoint to Congress.

Clean Air Act

President George Bush signed into law the first major amendment to the Clean Air Act in 13 years. Of particular interest to the aerospace industry is the requirement that the Environmental Protection Agency (EPA) write a Control Techniques Guideline (CTG) specifically for aerospace. AIA was successful in convincing both the House and Senate to include an aerospace CTG in its version of the bill, which virtually assured its inclusion by the conference committee. Other issues of concern to the industry, such as averaging and the permit process, were not handled as favorably.

National Noise Policy

In 1990 Congress established a national noise policy, an action AIA recommended in testimony before the House Aviation Subcommittee. The new law requires air carriers to phase out Stage 2 aircraft by the end of 1999. Congress will closely monitor the Department of Transporation's implementation of the new law. AIA's Office of Legislative Affairs worked with the House and Senate Aviation Subcommittees on several other issues including aging aircraft and accident prevention legislation.

International Issues

AIA monitored several international legislative issues of interest to the industry. The association worked closely with Congress on the development of language for inclusion in the Export Administration Act (vetoed by President Bush), which dealt with dual-use items. Other issues of interest include the Korean Fighter Program, Export-Import Bank funding, Most Favored Nation status for China, the Armenian Genocide resolution, offset policy, and Phase I of the sale of equipment to Saudi Arabia.

Thomas N. Tate
Vice President, Legislative Affairs, AIA

Defense Production Act

Despite a flurry of activity by House and Senate conferees to the Defense Production Act (DPA) Amendments, 1990 ended without a further extension of the DPA's authorities. Raising concerns that the legislation under consideration would harm U.S. industrial competitiveness, AIA's Office of Legislative Affairs worked with both the House and Senate during the year in an attempt to forge consensus. William Paul, senior vice president, United Technologies Corporation, testified on AIA's behalf, and AIA's International Council, Procurement and Finance Committee, and Technical and Operations Council developed an alternative "pro-competitiveness" piece of legislation for consideration by Congress. The Senate version of the DPA legislation incorporated some of AIA's ideas, such as full allowability of Independent Research and Development/Bid and Proposal costs.

Fiscal Year 1991 Defense Authorization

The annual defense authorization again included several procurement reform provisions. This year, however, Congress used the defense bill to address the beginning of the post-Cold War era. AIA maintained contact with House and Senate Armed Services staff as well as other congressional committees of jurisdiction during development and resolution of the authorization.

Economic Adjustment

Both the House and Senate convened task forces to examine the results of decreases in defense spending. Several extreme legislative proposals were seriously considered, including H.R. 101 (Ted Weiss, D-NY), which would have levied a tax upon contractors to create a relief fund, and Mary Rose Oakar's (D-OH) H.R. 3999, which would have created a vast new bureaucracy to administer economic adjustment. Final language addressing economic adjustment authorizes $200 million for those agencies already responsible for community outreach and planning.

Procurement Integrity

Citing Congress' inability to address the administration's Procurement Ethics Reform Act adequately before adjournment, Senator Carl Levin (D-MI) amended the Senate version of the defense bill to allow a further six-month extension of the effective date of the procurement integrity statute

(Section 27 of the Office of Federal Procurement Policy Act). Despite AIA arguments, the House refused to agree to a further extension, and only those statutes covering post-employment restrictions are suspended until May 31, 1991.

Suspension of Progress Payments

Language added during House and Senate floor consideration of the FY 1991 Defense Authorization would have required the suspension of all payments to a contractor when fraud was suspected in connection with the request for such payments. AIA Legislative Affairs was told that Congress did not intend to suspend all payments arbitrarily. Working with conferees and DoD, AIA drafted language that gives DoD an option to suspend or reduce payments and provides contractors with due process and a mechanism for automatic resumption of payments when a suspicion of fraud is unjustified.

Threshold for Submission of Cost or Pricing Data

During conference action on provisions amending the Truth in Negotiations Act, AIA supported a Senate provision to increase the threshold for submitting certified cost or pricing data to $500,000. The House bill, however, allowed waiver of the cost or pricing data requirement only upon a written determination by the contracting officer. AIA argued that given such a requirement, the contracting officer would rarely, if ever, approve such a waiver.

The conference compromise allows for an increase in the threshold to $500,000 for a trial, five-year period. During the third year of the trial, DoD's Inspector General would determine if threshold increases have affected instances of defective pricing.

Contract Crimes Sentencing Act

Representative George Miller (D-CA) introduced legislation that mandates a five-year debarment for federal contractors convicted of contract-related felonies twice within a 10-year span. AIA submitted testimony opposing the legislation at hearings before the House Judiciary Criminal Justice Subcommittee, asserting that present laws and regulations adequately protect the government's interests. The inflexibility of the mandatory requirement and possible repercussions upon innocent employees led Subcommittee Chairman Charles Schumer (D-NJ) to favor an alternative approach to the issue that will be introduced in the 102nd Congress.

Minority Subcontracting

In their continuing commitment to increase subcontract awards to Small Disadvantaged Businesses (SDBs), AIA and its member companies supported and encouraged legislation in the FY 1991 Defense Authorization to establish the mentor/protege test program. The program offers incentives to contractors for providing financial, contractual, and business assistance to SDBs in order to increase the supplier base.

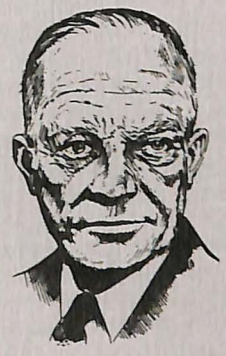
AIA also supported a provision in the Small Business Act (SBA) Reauthorization to encourage implementation of a voluntary, company-wide subcontracting test program developed in the FY 1990 DoD Authorization Act. The SBA bill suspended liquidated damages for the period of the test program.

Space Policy

Our civilian space program is in the midst of great changes. Congress and the administration have both taken steps to review NASA's current and future exploration objectives and goals. Congressional hearings on Space Station *Freedom*, its purpose and implementation, and reviews of other possible program starts, such as the Space Exploration Initiative (SEI), were conducted. AIA testified in support of SEI.

Fastener Quality Act

After three years of debate, the Fastener Quality Act was signed into law by the president on November 16, 1990. The bill establishes a standard traceability process by requiring federal laboratories to certify all manufactured fasteners both domestic and imported.



"Recognizing economic health as an indispensable basis of military strength and the free world's peace, we shall strive to foster everywhere, and to practice ourselves, policies that encourage productivity and profitable trade."

Dwight D. Eisenhower 1953

PROCUREMENT AND FINANCE

Procurement and Finance keeps up with legislative and regulatory changes and initiates actions for improvement in procurement and procurement-related issues, including patents and data rights.

New Committee Chartered

The Executive Committee of AIA's Procurement and Finance (P&F) Council formed the Washington Procurement Committee in 1990 to provide "quick reaction" advice on fast-track legislative and regulatory issues. The committee is primarily comprised of AIA-member company procurement and legislative representatives in the Washington area.

Aerospace Employment Cost Index

In 1990 the final year was completed of a three-year contract with the Bureau of Labor Statistics (BLS) under which BLS developed Employment Cost Indexes (ECIs) for aerospace. The ECI measures change in the cost of labor without the influence of employment shifts among occupations and industries. The compensation series includes changes in wages and salaries and employer costs for employee benefits.

In the past, Gross Average Hourly Earnings (GAHE) indexes were typically used as the basis for adjusting prices of contracts containing an Economic Price Adjustment Clause. GAHE indexes, however, did not accurately measure changes in labor costs in the aerospace industry. In addition, while the aerospace industry introduced Lump Sum Wage Payments into labor agreements in 1983, the BLS did not include them in GAHE indexes.

ECIs were developed for Standard Industrial Classifications (SICs) 372 (Aircraft and Parts), 3721 (Aircraft), 3724 (Aircraft Engines and Parts), 3728 (Aircraft Parts and Equipment, Not Elsewhere Classified), and 3761 (Guided Missiles and Space Vehicles). While the indexes have not yet been widely used because of their newness, several AIA-member companies will be using them either as prime contractors or subcontractors. AIA contracted with BLS to continue the program in 1991 and will evaluate during the year if it should be continued beyond 1991.

Foreign Selling Costs

In 1979 the Carter administration, as part of its policy to discourage sales of U.S. defense products overseas, revised Department of Defense (DoD) regulations to make foreign selling costs unallowable. AIA argued for years that this policy is inconsistent with normal business practices and sound accounting principles and places the U.S. defense industry at a disadvantage with foreign competitors.

The FY 1989 Defense Authorization and Appropriation Acts instructed DoD to prescribe regulations allowing foreign selling expenses, although with some limitations. Because the legislation has a September 28, 1991, sunset date, however, several DoD contracting offices maintain that the continued allowability of foreign selling costs beyond that date should not be considered in forward pricing unless further guidance is issued.

AIA believes that even if the entire rule expires in September 1991, nothing in the current regulations directs that foreign selling expenses are unallowable. This situation parallels pre-1979 when foreign selling costs were allowable with no statute or regulation to the contrary. Either Congress, by statute, or the Defense Acquisition Regulatory Council (DARC) and the Civilian Agency Acquisition Council, by regulation, would have to take some action to make these expenses once again unallowable.

Cost Principles and Cost Accounting Standards

As part of the *Defense Management Report* (DMR) regulatory relief effort, the AIA Cost Principles Committee led industry in preparing recommendations and rationale for revising the Cost Principles (Federal Acquisition Regulation [FAR] Part 31) and Cost Accounting Standards (CAS) (FAR Part 30). The review effort aimed to achieve consistency within and between the cost principles and CAS and to eliminate redundancy.

On March 16, 1990, AIA presented its recommendations and a broad overview to the Office of Cost, Pricing, and Finance in the Office of the Secretary of Defense (OSD). In September 1990 the DARC Cost Principles Committee began an 18-month incremental review of industry's cost principles

recommendations, and on September 11, 1990, industry and government held their first joint meeting.

Labor Costs

Another significant issue the Cost Principles Committee addressed in 1990 was the allowability of labor and benefit costs. Historically, the federal government intensely scrutinizes compensation costs through Contractor Employee Compensation Systems Reviews and Insurance/Pension reviews.

The Defense Contract Audit Agency (DCAA) frequently challenges the reasonableness of compensation, and disputes are relatively common. Regarding pensions and other benefits, companies must comply with a multitude of rules issued by the Financial Accounting Standards Board, the Internal Revenue Service, and DoD. Recent DCAA guidance on over-funded pensions and the impending release of Financial Accounting Standard 106, Accounting for Post Retirement Benefits Other Than Pensions, further complicate a difficult topic.

Sentencing Guidelines

On November 5, 1990, the U.S. Sentencing Commission released for public comment its proposed guidelines for sentencing of organizations. AIA's Legal Committee reviewed the document and found that the guidelines create serious problems for both large and small organizations. The guidelines should answer three fundamental questions: What are appropriate sentences for criminal violations by corporate entities? Upon what basis should they be determined? and What, if any, action should be taken by the Sentencing Commission?

The committee is preparing a response raising these and other questions.

Environmental Concerns

Environmental considerations are now important factors in many business decisions. A corporation's ability to recover prevention and clean-up costs incurred under government contracts is a major concern.

DoD drafted a new cost principle that would have, in effect, denied recovery of substantial environmental cleanup costs, but leaks of the draft created such concern it was withdrawn. AIA's Legal Committee developed an alternative cost principle, which it plans to circulate for industry comment, but is awaiting release of a revised DoD draft that may or may not satisfactorily address the allowability issue.

Alternative Dispute Resolution

In its broadest sense, Alternative Dispute Resolution (ADR) encompasses various procedures and methods for ending government contract disputes, including arbitration, mediation, mini-trials, and negotiation. ADR is a possible substitute for traditional litigation between government agencies and prime contractors, and while some important and large-dollar matters have been resolved using ADR techniques, it is largely untried in government contracts.

AIA's Legal Committee reviewed ADR issues and submitted conclusions to the P&F Council. The review, which is ongoing, analyzes factors companies should consider in deciding whether or not ADR is appropriate for a particular situation.

Financial Health of the Industry

In ongoing discussions, AIA and several Council of Defense and Space Industry Associations (CODSIA) members have pressed for DoD policy changes to improve the defense industry's financial health.

CODSIA advised Deputy Defense Secretary Donald Atwood that, even though the aerospace industry experienced a period of sales growth, the assets required to support the sales have grown much faster, earnings are down substantially, and debt is at record levels. In general, defense stocks declined while the market rose, and interest rates remained relatively constant in the last five years. But the amount of contract cost financed by industry has doubled.

A 90% progress payment rate would bring industry's investment in line with today's prime rate. (Note: *The Impact on Defense Industrial Capability of Changes in Procurement and Tax Policy, 1984-1987* —The MAC Group, February 1988—found that a 95% progress payment rate is needed to bring the rate of return on defense programs up to industry's minimum cost of capital.) Industry also recommended increasing the progress payment rate

"Today the expenditure of billions of dollars every year on weapons, acquired for the purpose of making sure we never need to use them, is essential to keeping the peace."

John F. Kennedy 1963

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Martin Marietta Corporation
Chairman, Tax Matters Committee

Elliott Dworin
IBM Corporation
Chairman, Economic Advisory Committee

Allen Grey
Honeywell, Inc.
Chairman, Legal Committee

on foreign military sales contracts to 95% so that industry would be more competitive in international markets.

DoD responded with a two-pronged proposal: 1) vary the progress payment rate depending on the interest rate and the length of the contract and 2) eliminate flexible progress payments. Unfortunately, industry would lose more than it gains under the DoD proposal, and so the dialogue continues.

Procurement Integrity

The procurement integrity statute, suspended November 30, 1989, for one year, became effective on December 1, 1990, but the "revolving door" provisions were again suspended through May 31, 1991.

One major change in the newly issued interim regulations is that contractor employees must certify only one time rather than annually. The certifications processed between July and November 1989 are not satisfactory, however, and a new certificate is required for each affected employee.

In other changes, procurements using sealed bidding require that all bidders submit certificates with their bids, but in negotiated procurements, only the successful offerer is required to certify. Subcontractor certifications are not required. Prime contractors who violate the statute are still subject to price or fee reductions, including an amount up to the subcontractor's profit or fee for subcontractor violations.

Congress will likely hold hearings on the entire statute and alternatives in 1991.

Defense Management Report Regulatory Review

Based on regulatory relief recommendations resulting from the DMR, the DARC is revising the Defense Federal Acquisition Regulation Supplement (DFARS) to make it shorter and more comprehensible. It is also trying to accommodate CODSIA's suggestion to include changes in such areas as certifications, dollar thresholds, documentation requirements, and approval levels that would reduce industry's costly, and often unnecessary, administrative burden.

AIA is participating with other CODSIA associations in the public comment phase of the DFARS revisions, which are being released in four increments. Eliminating unnecessary coverage and shortening and simplifying DFARS parts, published in the first installment, are important first steps.

CODSIA also made several more far-reaching recommendations for policy changes in DoD procurement, such as revising Part 6 to facilitate "best value" acquisitions. The deputy assistant secretary of defense (procurement) agreed to consider these recommendations, but this will be a separate effort after the DFARS rewrite is completed.

Byrd Amendment

The Procurement Techniques Committee submitted detailed comments on the proposed implementation of the Byrd Amendment, which was a rider to the Department of Interiors' FY 1990 Appropriations Act. Essentially, the legislation prohibits using appropriated monies to pay anyone to influence the award of a contract. (Profits or fees are not considered appropriated monies.)

In a June 12, 1990, memorandum, the Office of Management and Budget (OMB) attempted to clarify interim guidance it issued on December 20, 1989. Some of the more important clarifications are

- A newly-hired employee expected to be employed full time, that is more than 130 days, no longer has to file a disclosure.
- Selling activities before an agency by independent sales representatives are not covered, provided the selling activities occur before formal solicitation by an agency.
- Selling activities are limited to the merits of a matter; persons engaging in such activities are not deemed to be influencing and are not required to file a disclosure.

OMB's final guidance, expected in early 1991, will state that the federal government will assume a company did not spend appropriated funds illegally if that company can demonstrate it has sufficient profits to pay for any activities for which the use of appropriated funds would be prohibited. Nothing in the guidance requires changes to existing accounting systems. While AIA continues to believe that the Byrd Amendment was not needed, even for grants, and certainly should not apply to contracts, we think

the revised guidance is the best politically attainable. AIA-member companies normally do not lobby for award of individual contracts; therefore, few, if any, reports of such lobbying can be expected.

Reduction of Government Oversight

A continuing AIA and government objective, under the cognizance of the Procurement Techniques Committee, is a significant reduction in government oversight. One DoD initiative in this area is consolidating contract administration.

On June 30 Air Force plant representatives offices were incorporated into the Defense Contract Management Command (DCMC), the Air Force Systems Command eliminated its Contract Management Division, and the Army and Navy made similar changes. Several DCMC programs may also lead to reduced oversight: Performance Assessment Reviews (PARs), Exemplary Facilities (EF), In-Plant Quality Assurance Evaluation (IQUE), and Systems, Thresholds, Assignments, Revision, and Self-Governance (STARS).

- On-site PARs, which focus on continuous process improvement rather than inspection, are one major DCMC tool for monitoring contract performance. DCMC will use them to promote contractor self-governance, assess contract administration effectiveness, and identify process deficiencies.
- The EF program and the criteria for a facility to qualify are modeled after the Total Quality Management (TQM) criteria for the Malcolm Baldrige Award. IQUE and STARS are subsets of the EF program.
- IQUE uses a flexible, process-oriented TQM approach to quality oversight; STARS advocates system reviews, increases in the dollar thresholds for certain reviews, assignment of itinerant (rather than in-plant) oversight where it makes sense, revised intervals between reviews, and contractor self-governance efforts.

DCAA uses the Contractor Risk Assessment Guide (CRAG), a voluntary program to recognize a contractor's existing control systems in return for reduced or refocused government oversight. Since DoD issued the CRAG pamphlet in November 1988, contractor participation has increased.

Acquisition and Distribution of Commercial Products

In mid-1990 DoD proposed changes to the DFARS on acquisition of commercial products. The draft regulations contain requirements not necessary for commercial contracting and, in many cases, not required by statute.

Joining in a CODSIA response, AIA, in a position developed by the Procurement Techniques Committee, stated that a fundamental cultural change is necessary for DoD to remove the impediments companies encounter when offering commercial products to the government. An understanding of the basic principles of commercial product business, as embodied in the Uniform Commercial Code, is critical to avoid perpetuating procurement rules more suited for buying weapons systems.

AIA believes that DoD should develop a simplified contract for acquiring commercial products and services.

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The Boeing Company
Chairman, Procurement Techniques Committee

Patrick Jordan
GM/Hughes Aircraft Company
Chairman, Finance Committee

John Knox
Westinghouse Electric Corporation
Chairman, Procurement and Finance Council

Recoupment of Nonrecurring Costs

Since the mid-1960s, DoD policy requires the recovery of nonrecurring costs for industry sales of Major Defense Equipment (MDE) to foreign governments whether through Foreign Military Sales (FMS) channels or by direct industry sales to foreign governments. The Arms Export Control Act (P.L. 94-329) authorizes DoD to obtain reimbursement for a pro rata share of the funds it has invested in Research, Development, Test, and Evaluation (RDT&E) of MDE. DoD gradually extended recoupment to a much broader base of sales, however.

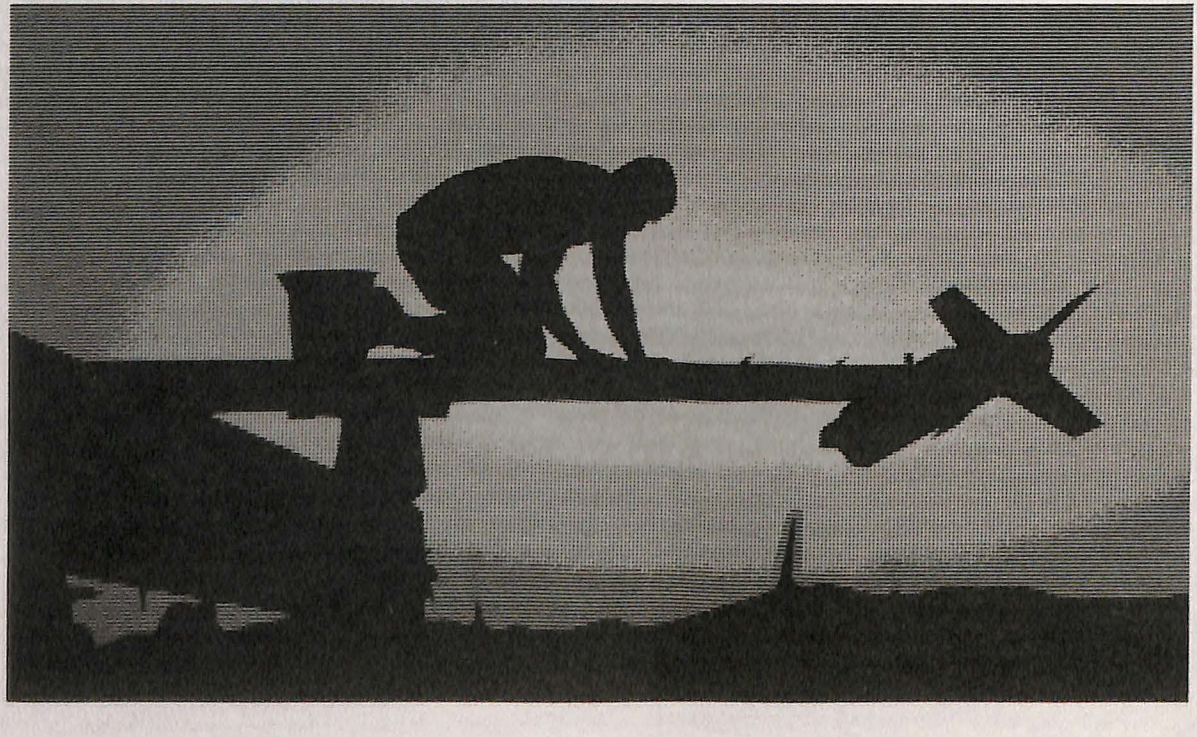
As of May 1, 1989, DoD reaffirmed and clarified the policy to state that recoupment of nonrecurring costs also applies to all sales, domestic and international, of nonmajor defense equipment, including products *derived from* RDT&E expended in the development of major or nonmajor defense equipment. "A derivative item" is one consisting of common parts equal to or more than 10% of the defense item. This expands the policy far beyond the requirement of the Arms Export Control Act and is counterproductive and detrimental to our national interests because it adversely affects U.S. industry's competitiveness.

A multi-association task force to address the issue 1) briefed government personnel on industry concerns, 2) conducted a survey to assess the economic impact of the expanded policy, and 3) sent a letter to the deputy defense secretary requesting that recoupment be limited to foreign military sales of MDE. The Defense Policy Advisory Committee on Trade also identified this policy as a significant issue.

Long-Term Contract Accounting

Don Fuqua testified in 1990 before the House Ways & Means Committee on the inequities of the current Percentage of Completion (POC) method for taxing profits from long-term contracts and requested consideration for changes to reduce the inequities. The POC method replaced the Completed Contract Method (CCM), which Congress eliminated as part of tax reform. AIA did not believe it was feasible to convince Congress to restore CCM.

At the request of the Treasury Department, AIA's Tax Matters Committee began a study of a more



equitable alternative to the POC method. Their study proposed a method of taxation whereby income would accrue on a contract commensurate with the expected rate of return on the investment in the contract. They tested this method using actual contract data. The committee planned to send the report to the Treasury Department by year-end.

Rights in Technical Data

AIA's long-term efforts to balance the interests of the government and contractors on rights in technical data progressed in 1990. The current DoD interim regulation, issued in October 1988, falls short of achieving this objective because it does not assure that contractor property rights in technical information are protected.

Responding to concerns from the OSD that various industry sectors had disparate views on the subject, the AIA Board of Governors Ad Hoc Committee on Rights in Technical Data established an Industry Executive Coordinating Group in January 1990 to organize the diverse views of industry sectors and make recommendations. Participating in this group are members of the ad hoc committee, AIA's president, the president of National Tooling & Machining Association, and the chairman of the Proprietary Industries Association. A working subgroup also includes a representative from the National Security Industrial Association and the chairman of the CODSIA Technical Data Task Group.

The group developed a set of policy principles as a basis for a regulation, which it presented to the deputy assistant secretary of defense for procurement. Industry believes that 1) the originator or developer of technical information (data) is the owner of the information, 2) the government is licensed for internal use and for reprocurement if it directly funded the development of the technical information, 3) in mixed funding situations, rights to use the technical information should be negotiated, and 4) if the government wants more extensive rights in a particular case, it should justify its need. Government's concern is that these principles could be overly restrictive and hamper its ability to use the technical information for government purposes.

On October 15, 1990, the government published a proposed FAR on Rights in Technical Data, which incorporated the policy in the DoD interim regulation. A series of public hearings began in October 1990 and were to conclude on January 31, 1991. While the proposed FAR is an improvement over the current 1988 DoD interim regulation, AIA's position is that it still is not a balanced, workable, and concise regulation. The industry working group is preparing an alternative regulation.

Accounting for Government-Furnished Material

AIA's Facilities and Property Committee continued its work to streamline the regulations that control the management of government property. It convinced DoD to put a two-year hold on implementing a financial accounting system for government-furnished material. Committee actions also resulted in two FAR deviations: 1) a one-year deviation from the cumbersome and costly record keeping, reporting, and administrative costs associated with the new Special Tooling clause published in Federal Acquisition Circular 84-53 in December 1989 and 2) a class deviation to give government property administrators the option of reviewing contractor's property control systems biennially instead of annually.

Committee efforts to obtain regulatory changes streamlining the property control system requirements and reducing the administrative cost of compliance for industry were successful.

- A FAR change removed the agency identification requirement for special tooling and special test equipment and identified the property as government-owned only, thereby eliminating the requirement to re-tag or re-identify property that transfers between agencies.
- A FAR change to Part 45.6 relieved contractors of attempting to return all excess government material to the supplier before disposal and of documenting all actions relating to the attempt. Under the revised requirements, contractors are only required to attempt to return government-owned material when feasible, and the requirement to document the attempt was eliminated.

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Chairman, Facilities and Properties Committee

Robert Melton
Lockheed Corporation
Chairman, Cost Principles Committee

Patrick Schlesinger
Rohr Industries, Inc.
Chairman, Intellectual Property Committee

LeRoy Haugh
Vice President, Procurement and Finance, AIA

TECHNICAL AND OPERATIONS

Brian E. Boyer
Northrop Corporation
Chairman, Manufacturing Committee

J.R. Burnett
TRW Space and Defense Sector
Chairman, Key Technologies Committee

Carlton Cabe
Bell Helicopter Textron
Chairman, National Aerospace Standards Committee

R.P. Caren
Lockheed Corporation
Chairman, Technical and Operations Council

Technical and Operations focuses on all aspects of technological, operations, and engineering efforts to advance all aspects of program management, industrial base, engineering, development, test, manufacturing, quality, materiel management, product support, and information to better address issues stemming from the production of aircraft, missiles, and space vehicles.

Systems Engineering Management

The Systems Engineering Standard, MIL-STD-499, is a key issue of AIA's Technical Management Committee (TMC). Historically, AIA-member companies have spent millions of dollars attempting to comply but without achieving any cost-effective benefits. The TMC volunteered the services of four people from member companies to work on a government/industry committee to prepare a new draft standard by June 1991.

Space Exploration Initiative

The National Space Council (NSpC) asked AIA to identify a process for evaluating and selecting the most promising concepts and technologies for the Space Exploration Initiative (SEI). An AIA Space Committee study group described a process that compares conceptual ideas with national objectives in order to assure their appropriate synthesis and evaluation. The report did not describe the program management aspect of SEI in detail, but recommended NASA as the proper agency to lead the SEI. NASA itself initiated a Synthesis Group to evaluate concepts and technologies for the SEI and used a process similar to the one AIA defined in its recommendations.

Acquisition Streamlining

AIA's Technical and Operations Council (T&OC) made substantial progress toward acquisition streamlining in 1990. It tailored appendices to military specifications and standards and, in conjunction with the *Defense Management Report* (DMR) review of the regulatory system, recommended strengthening the Defense Federal Acquisition Regulation Supplement (DFARS) 210.002, Policies, and DFARS 252.210-7005, Acquisition Streamlining.

AIA also participated in several related activities: the Air Force Systems Command (AFSC) study of the Request for Proposal (RFP) process, the Defense Science Board study on acquisition streamlining, and the Air Force/industry team effort to determine clear accountability in design.

Industry and AFSC teamwork led to the adoption of eight of 48 process improvement proposals to date. They include a standardized RFP format, more reasonable requirements for pricing data, the training of preparers for more up-front planning, and in-process reviews rather than stop/start actions.

Technical Data Packages

The Office of the Secretary of Defense (OSD) released the General Specification for Technical Data Packages (MIL-T-31000) in early 1990. The document covers design, product, commercial, production tooling, and test data requirements.

In a meeting with the government sponsor of MIL-T-3100, AIA's TMC expressed its concern that all of the specifications might be applied to every program rather than being tailored to individual programs and that it called for data that could be used to manufacture duplicate items without recourse to the original design activity. Furthermore, the specification uses different language on technical data rights than in the Federal Acquisition Regulation.

OSD agreed with industry's recommendation to delay the inactivation of DoD-D-1000 (Drawings, Engineering, and Associated Lists) until the rights in technical data language in the DFARS is completed and accepted new language industry proposed on the proper application of the specification to weapons systems acquisition. OSD incorporated the revised language into an interim amendment to MIL-T-31000 in August.

NIST Hearings

The National Institute of Standards and Technology (NIST) held hearings in April on improving U.S. participation in international standards-related activities. AIA and numerous other

industry associations and standards developing bodies supported retaining the existing, private sector-operated U.S. standards system rather than transferring control to the government. Congress plans a study on the topic for 1991.

Joint Integrated Avionics

The Joint Integrated Avionics Working Group (JIAWG) involves the Air Force, Army, and Navy in developing a Common Avionics Baseline (CAB) of standards and specifications for the Air Force Advanced Tactical Fighter, the Navy A-12, and the Army Light Helicopter. The JIAWG released CAB III in April 1990.

AIA's Electronic Systems Committee and Embedded Computer Software Committee established six joint projects to keep informed of JIAWG developments.

Air Force Software Action Teams

The Air Force organized seven Process Action Teams to implement recommendations in the Software Master Plan issued in 1990. The plan is intended to implement the recommendations made in the Air Force Studies Board Report, adapting software development policies and modern technology.

As chair of a Council of Defense and Space Industry Associations (CODSIA) project, AIA's Embedded Computer Software Committee is holding monthly meetings with Air Force representatives on implementing the plan's recommendations.

New NASA Metric Policy

A new NASA policy issued in July 1990 requires using the metric system in Requests for Proposal for all flight program new starts for which Phase C/D or equivalent acquisitions were initiated on or after October 1, 1990. NASA's deputy administrator can waive the policy; however, although ongoing programs may continue using conventional inch-pound system baseline for hardware design, they must be able to accommodate the metric hardware resulting from this transition. NASA asked the aerospace industry to cooperate in making the transition to the metric system.

Composite Materials

A comparison of Army, Navy, and Air Force damage tolerance criteria showed major differences for similar advanced composite applications. Consequently, AIA's Materials and Structures Committee (MSC) prepared a document establishing military standard damage tolerance requirements for advanced composite rotary and fixed-wing aircraft structures. The document describes guidelines to be used in the development of specifications for specific aircraft types, design requirements, and the method to inflict damage for verification testing.

The MSC began a standardization project to accelerate using and reducing the cost of advanced composite materials in aerospace products.

AIA Standardization Actions

- **National Aerospace Standards.** In 1990, its 50th year, the National Aerospace Standards Committee published more than 200 new or revised standards, including 14 new metric standards, and reviewed and reaffirmed 30 existing standards.
- **Standards in Electronic Format.** Three commercial technical information distributors under contract with AIA developed and began marketing AIA's approximately 2,800 National Aerospace Standards (NAS) in computer accessible formats. Their products, which will greatly reduce the time needed for engineers and manufacturers to research critical data, range in sophistication from raster scanned images with limited search capabilities to component drawings rendered into vector format for downloading into computer-aided design workstations.
- **National Institute of Aerospace Standards, Inc. (NIAS).** On February 28, 1990, AIA established a nonprofit corporation devoted exclusively to developing aerospace standards. A board of directors initially consisting of the president of AIA, the vice president of technical and operations, and the director of standardization programs manages NIAS. Corporation officers are a president, treasurer, and secretary. The director of AIA's standardization programs was appointed president.

NIAS submitted a proposal to the Army Light Helicopter program office for funding to develop 200 metric airframe standards over a five-year period.

"All the great leaders of our time, from Winston Churchill to John Kennedy, have understood that to maintain the peace we must maintain our strength. If we don't, our adversaries will be inspired to wild action by our weakness."

Ronald Reagan 1985

Walter S. Cebulak
Aluminum Company of America
Chairman, Engineering Division

Norm Collins
The Boeing Company
Chairman, Information Technology Committee

James C. Dever
General Motors/ Hughes
Chairman, Materiel Management Committee

Ray French
LTV Corporation
Chairman, Space Committee

Stan Friesen
General Electric Company
Chairman, Materials and Structures Committee

Joint Meetings and Conferences

In 1990 AIA hosted the first joint meeting on materiel management and procurement between the Electronics Industries Association (EIA) and AIA representatives. EIA hosted the third annual joint manufacturing conference of EIA, National Security Industrial Association (NSIA), AIA, and government representatives.

The materiel management/procurement program included presentations on Electronic Data Interchange at Rockwell, the integration of engineering, manufacturing, and materiel management on the Boeing 7X7, the European equivalent to MIL-STD-2000, developments in Small Disadvantaged Business (SDB) subcontracting, and self-management work teams at Boeing Electronics.

The manufacturing program included industry and government speakers who gave perspectives on the role of manufacturing in achieving affordability in both commercial and defense industries and in DoD.

Manufacturing Technology Advisory Groups

Three completed projects accomplished by AIA Manufacturing Technology Groups (MTAGS) in 1990 deserve special note.

After surveying AIA members on bar code technology, AIA found that its greatest use in manufacturing applications is in manufacturing resource planning, Just-In-Time manufacturing, and Total Quality Management (TQM). AIA concluded that the use of bar code technology in these areas as well as in design drawing identification, hazardous materials tracking and waste collection, and classified document tracking and personnel identification will increase.

A second MTAG project on hazardous chemical control and reporting will assist manufacturing personnel in understanding the laws and regulations governing control and use of hazardous chemicals, the requirements a hazardous chemical control system must satisfy, environmental system procedures, and system implementation requirements.

Through an MTAG project on Statistical Process Control (SPC) in the white collar work force, AIA learned that most companies are not very far along in educating their people about SPC and implementing it in the office environment but see great potential of SPC in the white collar work force. Present applications of SPC in the office environment include drawing sign-off, stockroom kitting operations, purchase document review, bill of material audits, environmental stress screening, and precontrol charting.

SDB Subcontracting

Legislators defeated a bill to increase the SDB subcontracting goal from 5% of subcontract dollars to 10% of total contract value but passed an amendment to the 1991 DoD Authorization Bill that creates an SDB mentor-protege program.

These actions reflect a change in congressional perspective by providing incentives and reimbursement to primes and major subcontractors who develop SDBs into suppliers and subcontractors rather than imposing more stringent requirements for SDB subcontracting. AIA and member company initiatives, such as AIA's nine-point SDB resolution, the SDB Database, and the SDB Strategies Study, led to a 40% increase in subcontract awards to SDBs over an 18-month period and contributed significantly to this change in attitude. Users of the SDB Database convened at a conference in December 1990 to evaluate and recommend improvements to the database.

AIA's SDB Development Panel and Materiel Management Committee will initiate actions on the mentor-protege program in 1991 and assist in developing the implementing regulations. Also in 1991, member companies will implement useful recommendations from the SDB Strategies Study.

TQM in Materiel Procurement

At least 50% of most aerospace industry products consist of components, subassemblies, and materials acquired from subcontractors and suppliers. By applying TQM principles to the processes they use in their materiel procurement function, aerospace companies could achieve significant costs savings, shorten cycle time, and simultaneously improve quality.

Toward this end, AIA's Materiel Management Committee (MMC) began two initiatives in 1990, one aimed at defining a streamlined materiel procurement function in the year 2000 and the other to identify and publish benchmarks for AIA-member companies to use in evaluating and improving their performance in procuring materiel.

Industrial Modernization

Industry representatives and DoD and service personnel discussed key issues of the Industrial Modernization Incentives Program (IMIP) at the first annual meeting of AIA's Industrial Modernization Committee (IMC) in August 1990. As a result of the meeting, AIA presented a white paper on needed changes in the IMIP program to the annual DoD/Industry MTAG/IMIP Conference in November 1990.

To improve the negotiations process for IMIP, the IMC Executive Committee worked with the Air Force to make the AIA National Aerospace Standard (NAS) Discounted Cash Flow (DCF) Model compatible with the Air Force model. Both Air Force and AIA-member company personnel used the revised AIA DCF Model (NAS 989), and all agreed that it produced the same results as the Air Force model. AIA published the revised model with diskettes and distributed it to member companies in September 1990.

Japanese Intelligent Manufacturing

AIA's Manufacturing Committee joined with other associations and the U.S. Department of Commerce to develop a more balanced counter proposal to the Japanese government's Intelligent Manufacturing System proposal. Many U.S. companies see the Japanese initiative as an attempt to dominate future manufacturing advancements. The original Japanese proposal is a $1 billion, 10-year cooperative science and technology program, controlled by the Japanese, which is restricted to industry and university participation from Japan, the European Community, and the United States.

Quality Issues

- **International Standards.** AIA's Quality Assurance Committee worked with DoD to reconcile international quality requirements with current applicable military standards. This may require the issuance of supplements because existing DoD standards are more exacting than the commercially oriented standards of the International Standards Organization (ISO).

Certification of industry quality processes is a recommendation under the ISO program, and failure to obtain such certification can be a barrier to international trade. Currently, there is no internationally recognized U.S. certifying organization; however, the committee is developing a position on steps AIA could take to promote a recognized U.S. certifying organization.

- **Regulatory Review.** The DMR prompted CODSIA to initiate a major case to review the DFARS. AIA's Quality Assurance Committee took a lead role in CODSIA by reviewing and commenting on the parts of the regulations that address quality assurance issues as well as the appendix covering material inspection and receiving reports. The committee submitted initial comments to the Defense Acquisition Regulatory Council in December.
- **Joint Prime Contractor Audit Program.** AIA's Supplier Quality Assurance Subcommittee completed 11 audits during 1990. Operating under guidelines from AIA's General Counsel and endorsed by the Defense Logistics Agency, the program fulfills DoD system audit requirements to provide suppliers with appropriate quality system data and to assure they have adequate systems for implementing these requirements.
- **Quality Measurement Standards.** AIA and government representatives held meetings and formally commented on an Air Force proposed revision to the standard for measuring quality screw threads. The proposed changes could be costly for industry, and because there has been no demonstrated need for the revisions, the proposal is now the subject of a General Accounting Office and DoD investigation. AIA requested a CODSIA case to address the issue.

Information Technology

- **Electronic Data Interchange (EDI).** The EDI panel of AIA's Information Technology Committee (ITC) and DoD representatives developed eight transaction sets that tailor the generic X.12 Data

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Richard McClellen
LTV Corporation
Chairman, Embedded Computer Software Committee

Kenneth L. Miller
General Dynamics Corporation
Acting Chairman, Product Support Committee

Robert E. Morris
General Electric Company
Chairman, Industrial Modernization Committee

William R. Mulligan
Grumman Corporation
Chairman, Service Publications Committee

Jerry Null
McDonnell Douglas Corporation,
Chairman, Spare Parts Committee

Exchange standard for use by aerospace and defense suppliers. DoD adapted the X.12 standard and will require it for formatted data transmissions. An AIA *X.12 Implementation Guide* covering these transaction sets will be available in January 1991.

- **Government Open Systems Interconnection Profile (GOSIP).** In April 1990, the ITC approved a year-long project aimed generally at evaluating and demonstrating electronic communications using GOSIP.

The GOSIP Demonstration Project resulted from recent government mandates that all contractors and government agencies must be capable of exchanging electronic information using GOSIP. The Federal Information Processing Standards (FIPS 146), which provides specifications for GOSIP, requires that new communications equipment and services purchased by government agencies after August 1990 must support GOSIP communications.

Using demonstration project data, AIA will evaluate the contract readiness of GOSIP communications in government contracts and report its conclusions to the federal government in mid-1991.

- **AIA-ATA Standards Compatibility.** Members of the Air Transport Association (ATA) and the Electronic Data Interchange Panel of the ITC are jointly developing technical applications that will allow electronic bridging between users of ATA's Spec 2000 (Commercial Data) standard and DoD's X.12 (Data Exchange) standard. A second phase of the project will examine how to bridge these standards with the United Nations standard for the international exchange of formatted documents.
- **Federal Communications Commission (FCC).** The FCC is considering a petition, RM7400, that would reallocate the principle frequency band used for flight test telemetry and measuring in the United States. The petitioner wants to establish a radio service that would deliver programming via satellite and ground transmitting facilities. Loss of the frequency would be costly for industry and could create unsafe testing conditions.

AIA joined an industry coalition opposing the proposed reallocation of wavelength, and, in a letter from Don Fuqua to FCC Chairman Alfred Sikes, AIA strongly endorsed the formal position of the Aerospace & Flight Test Radio Coordinating Council, whose membership includes many AIA-member companies. The Telecommunications Subcommittee of the ITC is monitoring the issue.

DoD Logistics Initiatives

Several AIA Product Support Committee activities in 1990 dovetailed with DMR initiatives and the recently established DoD Inventory Reduction Plan.

1. In January 1990 DoD asked AIA for industry recommendations on new business methods for managing logistics. CODSIA responded with input in 20 areas that focused on lifetime support strategies and commercial applications. The AIA Product Support Committee is working with DoD in several areas as a follow-on to this action.

2. The Spare Parts Committee is leading a tri-association (AIA/EIA/NSIA) joint DoD and industry Provisioning Process Action Team, which meets periodically to improve the provisioning process and standardize its procedures.

3. At the Navy's request, the Spare Parts Committee examined the problems of extended Procurement Administrative Lead Times (PALT). On average, 90% of spare parts requests are valued at less than $25,000 and represent only 5% of the total business volume. Yet, a significant portion of the overall administrative burden is expended on these requests.

A joint report of an ad hoc working group comprised of representatives from AIA, OSD, the military services, and the Defense Logistics Agency released at year-end recommends specific initiatives to reduce administrative lead time that, if implemented, would result in significant government and industry savings.

4. The Product Support Committee worked on materiel management issues under the Corporate Information Management program, depot maintenance, and on the review of existing support equipment acquisition procedures as a member of an AFSC-sponsored critical process team examining improvements in this area.

Technical Publications/Documentation

Significant advances are being made in digital electronic publishing, storage, and transmission of technical information. To support the transition of technical publications from paper to the digital electronics mode, the AIA Service Publications Committee took the industry lead for a joint government/industry study group under CALS to develop functional specifications for a pageless, paperless technical manual. The study group delivered final draft specifications for authorship, presentation/delivery, and data interchange to the government in 1990.

The Service Publications Committee also completed a guide to simplified graphics for publication in 1991, which describes techniques for digitizing, storing, retrieving, and transmitting graphics electronically in the most productive and cost-effective manner. These techniques apply to both the commercial and defense sectors of the industry.

Ongoing initiatives by the Service Publications Committee to introduce "Simplified English" and "Hazardous Warning Icons" in technical publications have been successful. Many are now incorporated into both civil and military technical publications. A similar effort to provide effective warning icons for the dangers of electrostative sensitive devices is underway.

Flight Critical Spare Parts

The General Accounting Office (GAO) is reviewing whether or not DoD procedures for break-out procurement of spare parts result in appropriate qualification and contractual quality requirements. GAO conducted detailed analyses of selected procurements at the San Antonio Air Logistics Center in 1990 to obtain the needed data.

The final report to Congress due in 1991 will recommend some improvements, but it is not expected to support industry contentions that existing DoD procedures are being improperly executed. The AIA Spare Parts Committee of Product Support oversees this area.

Contractors Training Guide

The AIA Manpower, Personnel, and Training Working Committee completed a comprehensive update of a 1966 document, now renamed the *Contractors Training Guide*. The guide describes hardware and personnel training requirements DoD and NASA agencies normally place on contractors for training services. Available in early 1991, it will greatly assist AIA-member companies entering into training services contracts with the government.

Key Technologies for the Year 2000

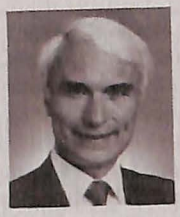
Work continued in earnest during 1990 on AIA's Key Technologies for the Year 2000 program. AIA completed two comprehensive strategic plans providing a national consensus on efforts needed in the next decade to accelerate Rocket Propulsion and Advanced Composites. Strategic plans for the remaining Key Technologies should be completed by June 1991.

The National Center for Advanced Technologies is planning a major symposium on national Key Critical Technologies in September 1991. The T&OC and the Key Technologies Committee will have a major impact on the symposium because of the volunteer effort they provide in developing the strategic plans. These strategic plans are unique in that they represent the consensus view of up to 1,000 government, industry, and academia experts in that particular technology.

While technology teams represent a bottom-up view, the AIA-sponsored Technology Policy Forum provides a top-down perspective on technology needs. The forum has been briefed on six of the key technologies. The forum, which is also interested in the implementation plans, will probably become more involved in regulatory and legislative issues that could inhibit technology development.

Recently, the T&OC agreed to add Advanced Metallic Structures to the list of Key Technologies with the understanding that it will be incorporated into the Advanced Composites plan when it has matured. The Key Technologies will continue to evolve and plans are to complement the National Critical Technologies effort of the President's Office of Science and Technology Policy.

John J. Robinson
United Technologies Corporation
Chairman, Quality Assurance Committee



Paul Santori
Honeywell, Inc.
Chairman, Manpower, Personnel, and Training Committee

Terry Scott
General Dynamics Corporation
Chairman, Flight Test Group

Mique Talcott
Rockwell International
Chairman, Electronic Systems Committee

Stan Siegel
Vice President, Technical and Operations, AIA

1991 Top Ten AIA Issues

Policy and Planning coordinates the key policy issues identified by the association's Board of Governors, including the annual review and revision of AIA's Top Ten Issues, so that goals and strategies for achieving consensus and action on behalf of the aerospace industry can be established.

"The chief national security lesson of this decade is simply this: strength secures peace. That fact remains true, even in the present time of transition in world affairs."

George Bush 1989

- **Aerospace: A Global Industry.** The U.S. aerospace industry must operate in the global marketplace to maintain its world leadership. Our companies must have access to foreign markets on an equitable basis and be able to work with foreign partners to spread risk, raise capital, improve market access, and develop new technology.
- **Maintaining a Vital Aerospace/Defense Technology Base.** Increasingly, defense expenditures are a smaller share of aerospace business. Defense requirements no longer drive a large share of aerospace innovation, and technical breakthroughs more often come from our commercial markets. Unfortunately, excessive specifications, standards, and regulations tend to isolate defense manufacturing from the commercial sector at a time when cost savings and technology advances might be derived from greater integration.
- **National Space Activities.** Proposed and ongoing space activities and their effective implementation are of major significance to aerospace. It is important to industry that we have a level playing field and equal access in all areas of space. The U.S. government has made a commitment to promote the commercial launch industry, and it is appropriate to reaffirm that policy and ensure effective enforcement.
- **Civil Aviation.** Manufacturers of civil aviation products have entered a critical period. Industry and government are addressing major regulatory and policy issues, and the solutions will have a major effect on the industry for years to come. Areas of important activity include the search for agreed rules covering the involvement of governments in support of civil programs, continuing efforts to improve safety, maintaining the role of the Federal Aviation Administration as the world's preeminent airworthiness authority, and the development of a coherent national transportation policy.
- **Key Technologies for the Year 2000.** Key Technologies is an industry-led cooperative effort, with government and university participants, to develop National Technology Development Plans emphasizing technologies most important to the aerospace industry during the next decade.
- **Improved Acquisition Policy.** The acquisition process should be simplified and policies adjusted to recognize the changing environment caused by defense down-sizing, to maximize the return to the taxpayer for every defense dollar, and to provide a more favorable atmosphere for changing the adversarial government/industry relationship.
- **Strengthening the Defense Industrial Base.** Congress, DoD, and industry must cooperate in bringing about an orderly transition to reduced spending levels and at the same time ensure a viable industrial base that is able to develop, produce, and support systems for our national defense, to compete for a significant share of the global market, and to respond with increased capacity in emergency situations.
- **Economic Adjustment for Aerospace.** The problem of belt-tightening and reduced defense needs is exacerbated by the numerous and costly regulatory and legislative requirements placed on the defense industry during the decade of rising budgets and unprecedented build-up. Congress and DoD need to take action to streamline and simplify the acquisition process so that defense dollars go as far as possible.
- **SDB Subcontracting.** The momentum of successful actions in 1990 by AIA and its member companies must be maintained to increase further subcontract awards to Small Disadvantaged Businesses (SDBs) and to continue to demonstrate industry's long-term efforts to address this issue.
- **Environmental Initiatives.** AIA member companies are engaged in ongoing efforts to protect the health and safety of aerospace workers and surrounding communities and to being conscientious stewards of the environment. At the same time, however, the aerospace industry must ensure that there is no sacrifice in product quality or damage to the competitive position of American aerospace products in the international market.

Sandra W. Wobbe
Assistant Vice President, Policy and Planning, AIA

AIA-Member Companies—Year-end 1990

Aerojet, A Segment of GenCorp
Aeronca, Inc., A Fleet Aerospace Company
Allied-Signal Aerospace Company
Aluminum Company of America
Argo-Tech Corporation
BASF Structural Materials, Inc.
Bechtel National, Inc.
Best Foam Fabricators, Inc.
The BFGoodrich Company
B.H. Aircraft Company, Inc.
The Boeing Company
Chrysler Technologies Corporation
Coltec Industries Inc
- Chandler Evans
- Menasco Aerosystems
- Walbar

E-Systems, Inc.
Fairchild Industries, Inc.
Fairchild Space and Defense Corporation
Ferranti Defense & Space Inc.
- Marquardt

FMC Corporation
General Dynamics Corporation
General Electric Company
General Motors Corporation
- General Motors Hughes Electronics
  - Delco Electronics
  - Hughes Aircraft Company
- Allison Gas Turbine Division

Grumman Corporation
Harris Corporation
Heath Tecna Aerospace Company
Hercules Incorporated
Hexcel Corporation
Honeywell Inc.
IBM Corporation
- Federal Sector Division

ITT Defense, Inc.
Kaman Aerospace Corporation
Lockheed Corporation
Lord Corporation
The LTV Corporation
Lucas Aerospace Inc.
Martin Marietta Corporation
McDonnell Douglas Corporation
Northrop Corporation
Ontario Corporation
Parker Hannifin Corporation
Precision Castparts Corp.
Raytheon Company
Rockwell International Corporation
Rohr Industries, Inc.
Smiths Industries Aerospace & Defense Systems, Inc.
Sundstrand Corporation
Teledyne, Inc.
- Teledyne Brown Engineering
- Teledyne Controls

Texas Instruments Incorporated
- Defense Systems & Electronics Group

Textron Inc.
Thiokol Corporation
TRW Inc.
Unisys Corporation
United Technologies Corporation
- Aerospace/Defense:
  - Pratt & Whitney
  - Sikorsky
  - Hamilton Standard
  - Norden

Westinghouse Electric Corporation
- Electronic Systems Group

Williams International

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Arthur E. Wegner, *Vice Chairman*
Don Fuqua, *President*
George F. Copsey, *Secretary-Treasurer*

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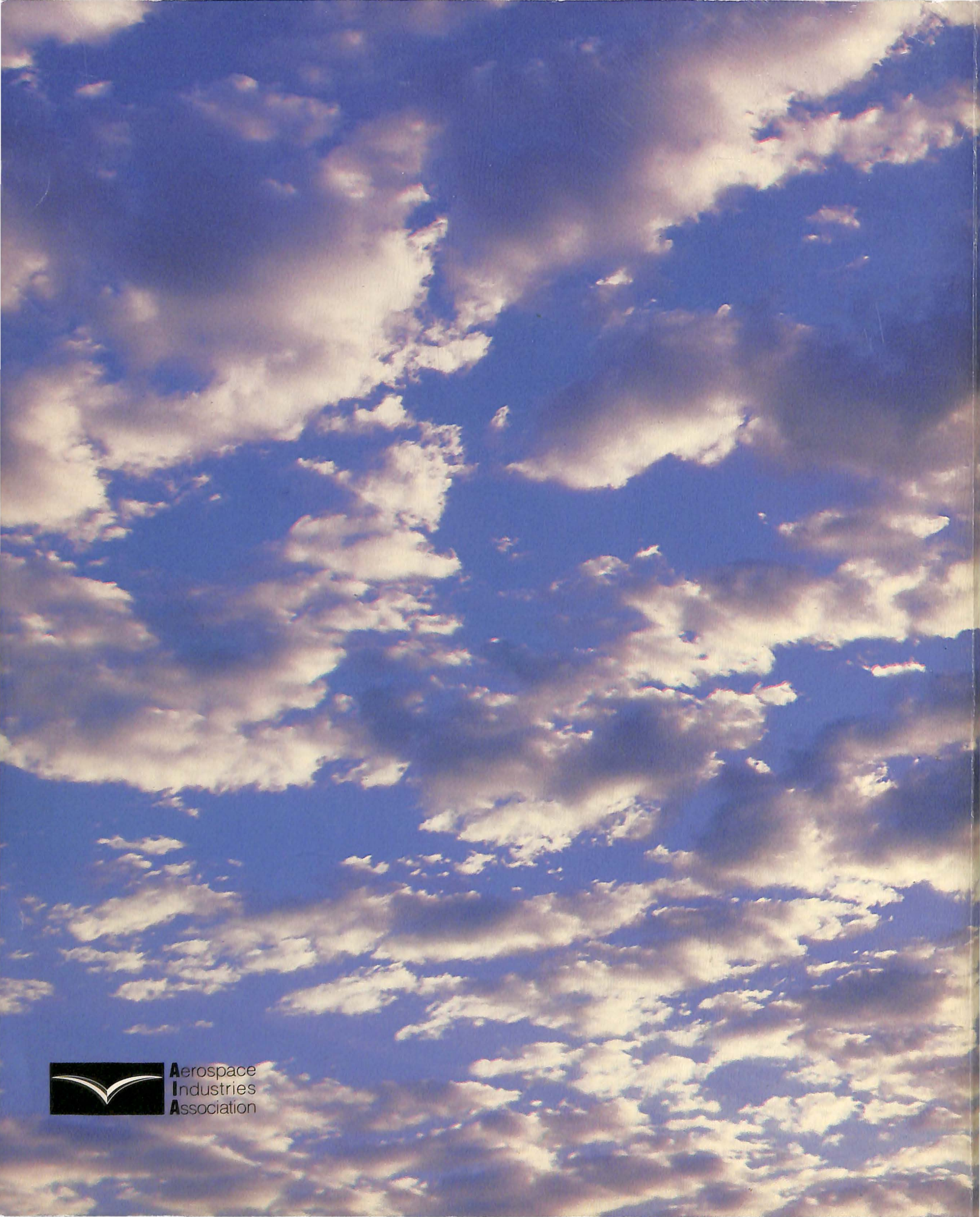
Don Fuqua, *President, Aerospace Industries Association*
Edward E. Hood, Jr., *Vice Chairman of the Board and Executive Officer, General Electric Company*
Richard A. Linder, *President, Electronic Systems Group, Westinghouse Electric Corporation*
John F. McDonnell, *Chairman and Chief Executive Officer, McDonnell Douglas Corporation*
Dennis J. Picard, *President, Raytheon Company*
Daniel M. Tellep, *Chairman and Chief Executive Officer, Lockheed Corporation*
Arthur E. Wegner, *President, Aerospace/Defense, United Technologies Corporation*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