Chairman’s Message

Welcome! The 29th Space Congress committee has chosen for its theme “Space — Quest for New Frontiers.” This theme symbolizes exciting discoveries and opportunities waiting for our Nation and the international space community in the exploration and the use of space. Renewed enthusiasm and national dedication to this “quest” is required for the full potential of space and its new frontiers to be realized.

The 29th Space Congress is sponsored by the Canaveral Council of Technical Societies (CCTS) and supported by the National Aeronautics and Space Administration (NASA) and the Department of Defense (DoD). In addition, the Space Coast communities, local Aerospace Contractors and citizens are instrumental in putting together this most informative symposium and in helping the Space Congress maintain its well deserved reputation as the premier conference on space technology. This year is no exception!

Panel sessions this year focus on NASA’s Space Station Freedom Program, upcoming initiatives in Space Technology, the increasing importance of DoD Space Operations and DoD Research and Development activities. Technical paper sessions will provide detailed insight on such topics as Space Education, National Launch Systems, Interstellar Initiatives, Space Shuttle, DoD Space Operations and Research and Development, Space Station, Commercial Space Development, and the Space Exploration Initiative.

A distinguished group of speakers are scheduled for this Congress. Bob Crippen, Center Director, Kennedy Space Center, will give the keynote address at the opening session and Lt. Gen. Thomas S. Moorman, Jr., Vice Commander, Air Force Space Command, Peterson AFB, CO, will speak at the Tuesday evening banquet. Other speakers include Brig. Gen. Jimmey R. Morrell, Commander, 45th Space Wing; Dr. Paul F. Murphy, APQC Consulting Group; Richard H. Kohrs, NASA Director for the Space Station Freedom Program; Mr. Howard Benedict, Executive Director Mercury 7 Foundation; Lt. Gen. Edward P. Barry, Jr., Commander, Space Systems Division and Mr. Gregory M. Reck, Director for Space Technology in NASA Hq. Office of Aeronautics and Space Technology. Bob Crippen will also introduce the “Meet the Astronauts” Panel. In addition, an exceptional group of leaders will be chairing the paper sessions.

On behalf of this year’s committee, I invite you to join us at the 29th Space Congress in April. We are looking forward to seeing you there and are confident you will have an enjoyable and enlightening time.

Frank Watkins
General Chairman
29th Space Congress
Information

Headquarters/Registration

Headquarters for the Twenty-Ninth Space Congress is the Holiday Inn, Cocoa Beach. Registration will take place in the Dolphin Room from noon to 5:00 p.m. Monday, April 20, 1992. Registration will continue from 7:00 a.m. to 5:00 p.m. on Tuesday, Wednesday and Thursday, and from 7:00 a.m. to noon on Friday.

PACKAGE REGISTRATION ........................................ $130.00
(Includes first five items listed below)
Tuesday Luncheon ........................................ 10.00
Tuesday Banquet ........................................ 25.00
Wednesday Luncheon ....................................... 10.00
Proceedings ................................................ 70.00
Sessions all four days ..................................... 30.00
Individual Sessions ....................................... 5.00
Individual Sessions (Students) ....................... 2.00
Golf ................................................................... 35.00

Package registration will save you money; however, each item may be purchased individually at the listed price. Telephone contact can be made through the Holiday Inn, (407) 783-2271 (ask for Dolphin Room) or directly by calling (407) 868-2147.

Press Room

The press facility is located in the Skylab Room of the Howard Johnson Plaza-Hotel. The press facility is staffed and directed by Chuck Morley and J. B. Kump from 12 noon to 5:00 p.m. on Monday and from 8:00 a.m. to 5:00 p.m. on Tuesday, Wednesday and Thursday and 8:00 a.m. to noon on Friday. The telephone number for the press facility is (407) 868-2147.

Message/Locator Assistance

The sponsoring organization, the Canaveral Council of Technical Societies (CCTS), maintains an office with telephone (407) 868-1623 and fax (407) 783-5579 for convenience of Space Congress participants. It also assists attendees by maintaining a message board. Registrants who wish to leave lodging and local phone information can do so by turning in locator forms, available at the Registration Desk, to the CCTS Message/Locator Desk located in the Dolphin Room, Holiday Inn, or by phone to (407) 868-2345.

Proceedings

The proceedings of the Twenty-Ninth Space Congress are available at the registration desk in the Holiday Inn during the Space Congress. After the close of the Space Congress, additional proceedings can be purchased for $70 each plus postage from Secretary, CCTS, Post Office Box 245, Cape Canaveral, Florida 32920.

Exhibits

Exhibits will include a Showcase Exhibit, computer graphics demonstrations and displays of the Space Shuttle, Shuttle Payloads, Space Station, Expandable Launch Vehicles, and other space related activities. The Cocoa Beach Hilton, Exhibit Hall, and the Crossway Inn will be open to the public on the following schedules: Tuesday - 11:00 a.m. to 7:00 p.m.; Wednesday - 11:00 a.m. to 8:00 p.m.; and Thursday - 9:00 a.m. to 3:00 p.m.

Exhibitors

ADC Government Operations
Analex Space Systems Inc.
BAMSI, Inc.
Brown & Root Services Corp.
BRPH
Communications Concepts, Inc.
Computer Sciences Raytheon
Digital Equipment Corporation
Eastman Kodak Company
EG&G Florida, Inc.
Final Frontier Magazine
General Dynamics Space Systems Division
Government Technology Services, Inc.
Harris Corporation
Hewlett Packard
Honeywell, Inc.
International Business Machines Corporation
ITT Federal Serv. Corp.
Johnson Controls Inc.
Lockheed Missiles and Space Company
Lockheed Space Operations Company
Martin Marietta Astronautics Group
McDonnell Douglas Corporation
Microsoft Corporation
Modcomp
Morton Thiokol Corporation
NYMA, Inc.
Planning Research Corporation
Rocketdyne
Rockwell International
Silicon Graphics
STC
Sun Microsystems
Teledyne Brown
TRW, Inc.
United Technology Corporation
Vitro Corporation
Xerox

Youth Science Fair

Science fair displays and demonstrations from local secondary school students will be open to the public from 11:00 a.m. to 7:00 p.m. on Tuesday, and 12:00 noon to 8:00 p.m. on Wednesday. The Thursday schedule is from 9:00 a.m. to 1:00 p.m. All Youth Science Fair activities will take place in the Dolphin Room of the Cocoa Beach Holiday Inn. Judging will be conducted from 8:00 a.m. to 12:00 p.m. on Wednesday, April 22. The awards will be presented to the winners at the "Meet the Astronauts" panel session to be held at the Howard Johnson Plaza-Hotel in Cocoa Beach at 7:00 p.m. on Thursday, April 23.
Pioneers' Day Banquet '92 will be held on Friday, April 24, at the Officers' Club, Patrick Air Force Base.

Social Hour: 6:30 p.m.
Dinner: 7:30 p.m.
Speaker: Vincent Edward Spezzano, Retired, Chairman of Gannett and Florida Today

Registration is April 21, 22 and 23 at the Dolphin Room, Holiday Inn, Cocoa Beach, and 5:30 to 6:30 p.m. at the Officers' Club on April 24.

Space Congress Golf Tournament
Golfers will be able to enjoy a tournament at the Patrick AFB Course on Friday, April 24.

The tournament will be a four player, select shot format, as in the past. You may sign up with one partner or by yourself. The tournament committee will assign teams based on playing ability. Foursomes may sign up if they provide a combined total certifiable handicap of 55 or higher. Fill in your name and average score or handicap for 18 holes on the registration form, along with the same for your partner, and enclose $35, each person. A maximum of 144 players will be registered on a first come, first in basis. Lunch, refreshments on the course, green fees, carts, and trophies are included in the fee. Buffet lunch from 11:00 a.m., and shotgun start at 12:30 p.m. will allow completion in time for Pioneers' Banquet attendance. Maps are available at the Registration Desk.

Canaveral Council of Technical Societies

CCTS Member Societies:
Air Force Association
American Institute of Aeronautics and Astronautics
American Institute of Architects
American Meteorological Society
American Society of Civil Engineers
American Society of Heating, Refrigeration and A/C Engineers
American Society for Industrial Security
American Society of Mechanical Engineers
American Society for Nondestructive Testing
American Society for Quality Control
American Society for Safety Engineers
American Society for Training and Development
American Welding Society
Armed Forces Communication Electronics Association
Florida Engineering Society
Florida Space Business Roundtable
Institute of Electrical and Electronic Engineers
Institute of Industrial Engineers
Instrument Society of America
Missile, Space and Range Pioneers, Inc.
NASA Alumni League
National Contract Management Association
National Space Club
National Technical Association
Society for the Advancement of Materials and Process Engineering
Society for Technical Communications
Society of Logistics Engineers
Society of Manufacturing Engineers
Society of Photo-Optical Instrumentation Engineers
Society of Women Engineers

Associate Members:
Association for Quality and Participation
National Management Association, Florida Space Coast Council
USAF Space & Missile Museum Foundation

Many of the societies will have educational/promotional brochures/information on display at the CCTS Desk at the Holiday Inn and the Hilton Exhibit Center. Attendees are invited to stop by and review this material.

Attraction Centers
Late April in Florida is a delightful time of year for the entire family. The weather is pleasant, the hardy find the Atlantic warm enough for swimming and tourist attractions are not yet crowded. Cocoa Beach offers a long stretch of swimming beach, surfing areas, and both deep-sea and shore fishing. Three and four day cruises aboard the SS Oceania, the SS Atlantic, the SS Majestic, the Carnivale or the Mardi Gras can be enjoyed from Port Canaveral. Bus tours of the Kennedy Space Center and Cape Canaveral Air Force Station are available from the Spaceport, USA where a free exhibit-filled space museum can be enjoyed by both children and adults.

Within one to two hours drive is a world of vacation fun at Walt Disney World in the Magic Kingdom, EPCOT Center, or Disney/MGM Studios, Universal Studios, Florida - Sea World, one of America's finest marine attractions - the mystery and excitement of Africa in Busch Gardens - famed Glass Bottom boats at Silver Springs - the beautiful gardens and daily water ski revue with lovely aquamaids at Cypress Gardens.

![Map of Florida with key locations marked, including Orlando, Sea World, Cypress Gardens, and other attractions.](image-url)
Robert L. Crippen (Captain USN, retired) became the director of NASA's John F. Kennedy Space Center effective Jan. 1, 1992.

Crippen has served as Director, Space Shuttle, at NASA Headquarters in Washington, D.C. from January 1990 until he was named KSC director by NASA Administrator Richard H. Truly. In his Headquarters post he was responsible for the overall Shuttle program requirements and performance, and total program content.

Born Sept. 11, 1937, in Beaumont, Texas, Crippen received a Bachelor of Science Degree in Aerospace Engineering from the University of Texas in 1960.

He was commissioned through the U.S. Navy's Aviation Officer Program. As a Navy pilot from June 1962 to November 1964, he completed a tour of duty aboard the aircraft carrier USS Independence. He later attended the USAF Aerospace Research Pilot School at Edwards Air Force Base, Calif. Upon graduation, he remained at Edwards as an instructor until his selection for the USAF Manned Orbiting Laboratory (MOL) Program in October 1966.

Crippen became a NASA astronaut in September 1969. He was a member of the astronaut support crew for the Skylab 2, 3 and 4 missions and for the Apollo-Soyuz Test Project mission.

He was the pilot of the first orbital test flight of the shuttle program and was the commander of three shuttle flights: STS-7, June 8-24, 1983; STS 41-C, April 6-13, 1984; and STS 41-G, Oct. 6-13, 1984.

Crippen was stationed at KSC from November 1986 to December 1989, serving as Deputy Director, Shuttle Operations, for NASA Headquarters. He was responsible for final Shuttle preparation, mission execution and return of the orbiter to KSC following landings at Edwards AFB, Calif.

Crippen's accomplishments have earned him many notable awards: the NASA Exceptional Service Medal in 1972; five awards in 1981, including the Department of Defense Distinguished Service award, the American Astronautical Society Flight Achievement Award, the National Geographic Society's Gardiner Greene Hubbard Medal, and the Aviation Hall of Fame.

In 1982 he won the Federal Aviation Administration's award for Distinguished Service, the Goddard Memorial Trophy and the Harmon Trophy. In addition, Crippen has received four NASA Space Flight Medals.

Crippen is married to the former Pandora Lee Puckett of Miami, Fla. He has three daughters: Ellen, Susan and Linda.

**TUESDAY, APRIL 21**

**KEYNOTE ADDRESS (8:30 a.m. to 9:00 a.m.)**

Howard Johnson Plaza-Hotel, Challenger Main Ballroom

**Introductions:** Frank Watkins

**Speaker:** Robert L. Crippen

**Center Director, NASA, Kennedy Space Center, FL**

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**LUNCHEON (12:00 noon to 1:30 p.m.)**

Holiday Inn, Manatee Room

**Introductions:** Frank Watkins

**Speaker:** Dr. Paul F. Murphy

**Vice President, APQC Consulting Group, Houston, TX**

Paul Murphy is a member of the APQC Consulting Group, a subsidiary of the American Productivity and Quality Center.

Prior to joining APQC Consulting, Dr. Murphy was Director of Total Quality Management with Aerojet TechSystems in Sacramento, California, where he implemented a company wide TQM initiative for this leading edge, space launch vehicle motor manufacturer; and created and managed a $5 million, 1700 person TQM Training Program.

Dr. Murphy has extensive experience implementing quality improvement processes in the Department of Defense, industry, and government. Since joining the APQC Consulting Group Dr. Murphy has consulted and instructed in TQM with a variety of clients, large and small, from all areas of the nation.

He served in the White House as Special Assistant to the Director, Office of Management and Budget (OMB). Prior to that, he was Military Assistant to the Assistant Secretary of Defense and a representative to The Technical Cooperation Programme (TTCOP), an international scientific forum. He previously was Senior Behavioral Scientist at Air Force Headquarters, and led the initial application of quality management techniques. He later served as Chairman of the Department of Command & Management at the Air University, where he received the Air Force's highest award for contributions to Professional Military Education. In civilian industry as Senior Program Director with Aeroflex Systems Corporation, Dr. Murphy directed consultant support for a $3 billion program.
PAPER SESSION I (2:00 p.m. to 5:00 p.m.)

A. DoD SPACE OPERATIONS
Howard Johnson Plaza-Hotel, Atlantis/Discovery Rooms

Session Chairman: Col. William R. Johnson, Jr., USAF, Deputy Director for Weather, Air Force Space Command, Peterson AFB, CO

Session Organizer: Capt. Richard Einstman, USAF, Space Shuttle Range Operations Officer, 45th Range Squadron, Patrick AFB, FL

1. WEATHER IMPACTS ON SPACE OPERATIONS
Col. J. Madura, USAF, 45th Weather Squadron, Air Force Space Command, Patrick AFB, FL
Capt. W. Bauman, USAF, 45th Weather Squadron, Air Force Space Command, Patrick AFB, FL
Capt. B. Boyd, USAF, 45th Weather Squadron, Air Force Space Command, Patrick AFB, FL
Maj. N. Wyse, USAF, 45th Weather Squadron, Air Force Space Command, Patrick AFB, FL
Capt. M. Adams, USAF, 45th Weather Squadron, Air Force Space Command, Patrick AFB, FL

2. SPACE APPLICATIONS — ANOTHER WINGMAN
Lt. Col. James O. Hale, USAF, Chief, Space Applications Division, Headquarters Air Force Space Command, Peterson AFB, CO

3. SPACE STRATEGY AND THE NEW WORLD ORDER

4. PLANNING FOR THE PERFORMANCE OF FUTURE SPACE BASES
Duane E. Knutson, New Mexico Engineering Research Institute
Dr. Robert C. Hawkins, New Mexico Engineering Research Institute

5. TITAN IV INTEGRATE. TEST AND LAUNCH FACILITY SYSTEM IMPROVEMENTS
Carl C. Fischer, Martin Marietta, Titan IV Program Space Launch Systems, Cocoa Beach, FL
Capt. Phillip A. Ray, USAF, 45th Operations Group, Cape Canaveral AFS, FL

6. A NEW GUIDANCE & CONTROL UNIT FOR THE TITAN IV VEHICLE
R. Joseph Wright, Jr., Honeywell Space and Strategic Systems Operation, Honeywell, Inc., Clearwater, FL

B. SPACE SHUTTLE & PAYLOADS
Howard Johnson Plaza-Hotel, Columbia/Enterprise Rooms

Session Chairman: Brewster H. Shaw, Deputy Director, Space Shuttle Operations, NASA Headquarters at Kennedy Space Center

Session Organizer: Carrie L. Parrish, NASA, Kennedy Space Center, FL

1. NON-DESTRUCTIVE EVALUATION OF SHUTTLE COLUMBIA TILES
Richard M. Davis, Advanced Systems and Technology Office, NASA, Kennedy Space Center, FL
Dr. Faisal A. Moslehy, Dept. of Mechanical & Aerospace Engineering, University of Central Florida, Orlando, FL
Dr. Margaret M. Clarke, Rockwell International, Downey, CA
A. J. Mauceri, Rockwell International, Downey, CA

2. SPACE SHUTTLE PAYLOAD ACCOMMODATIONS AND TRENDS IN CUSTOMER DEMANDS
Daniel L. Hedin, Aerospace Technologist, NASA, Washington, D.C.
James R. Wilson, Aerospace Engineer, McDonnell Douglas Space Systems Co., Washington, D.C.

3. SPACEHAB: AUGMENTING THE SHUTTLE'S MIDDECK CAPACITY
Dr. Barbara A. Stone, Director, Plans, Policy & Evaluation Division, Office of Commercial Programs, NASA, Washington, D.C.
David A. Rossi, Vice President, SPACEHAB Inc., Washington, D.C.

4. COMPUTATIONAL FLUID DYNAMICS ANALYSIS OF SPACE SHUTTLE VEHICLE AND EXHAUST PLUME FLOWS AT HIGH ALTITUDE FLIGHT CONDITIONS
N. Sam Dougherty, Rockwell International, Space Systems Division, Huntsville, AL
J. B. Holt, Rockwell International, Space Systems Division, Huntsville, AL
B. L. Liu, Rockwell International, Space Systems Division, Huntsville, AL
S. L. Johnson, Rockwell International, Space Systems Division, Huntsville, AL

5. GENERIC PROPELLANTS TRANSFER UNIT (GPTU)
Christopher A. Cook, EG&G Florida, Kennedy Space Center, FL

6. GSIM: A LOW COST MBR APPROACH FOR KSC DESIGN AND OPERATIONS
John Wilkinson, Lockheed Space Operations Co., Titusville, FL

C. SPACE EDUCATION
Holiday Inn, Manatee Room

Session Chairman: Dr. Robert W. Brown, Deputy Associate Administrator, Office of Human Resources and Education, NASA, Washington, D.C.

Session Organizer: Shamsul Multia, Advanced Programs, Harris Space Systems Corporation, Rockledge, FL
1. AEROSPACE AND AMERICA 2000 COMMUNITIES
   John F. Will, Secretary's Regional Representative, U.S. Dept. of Education, Atlanta, GA

2. A COMMUNICATION SATELLITE DEDICATED TO THE DELIVERY OF EDUCATIONAL PROGRAMMING
   Frank C. Weaver, CEO, UNET Communications, Inc., Fort Washington, MD

3. BUILDING AN INTELLECTUAL INFRASTRUCTURE FOR SPACE COMMERCE
   Dr. Barbara A. Stone, Director, Plans & Policy Division, Office of Commercial Programs, NASA, Washington, D.C.
   Jeffrey L. Struthers, Vice President for Strategic Initiatives, Center for Space & Advanced Technology, Fairfax, VA

4. MAKING SPACE PART OF GENERAL EDUCATION
   Dr. Stephen Horan, New Mexico Space Grant Consortium, New Mexico State University, Las Cruces, NM

5. THE FUTURE OF THE SPACE PROGRAM IS IN THE HANDS OF AN UNEXPECTED CUSTOMER
   William Y. McCaslin, Vice President and Core Project Manager, Harris Space Systems Corp., Rockledge, FL
   Dr. Charles D. Westerfield, Staff Engineer, Harris Space Systems Corp., Rockledge, FL
   Cinsy M. Krehbiel, Lead Engineer, Harris Space Systems Corp., Rockledge, FL

6. CAREER OUTCOMES ASSESSMENT AND HUMAN RESOURCE POLICY IN SCIENCE AND ENGINEERING
   Dr. Cheryl B. Leggon, Staff Officer, National Research Council, Office of Scientific and Engineering Personnel, Washington, D.C.

SPACE CONGRESS BANQUET
Howard Johnson Plaza-Hotel, Challenger Main Ballroom

Social Hour: 7:00 p.m.
Dinner: 8:00 p.m.
Program: 9:00 p.m.
Introductions: Frank Watkins
Speaker: Lt. Gen Thomas S. Moorman, Jr.
   USAF, Vice Commander, Air Force Space Command, Peterson AFB, CO

General Moorman was commissioned through the Air Force Reserve Officer Training Corps as a distinguished military graduate in 1962. He initially served as an intelligence officer with the B-47 bombardment wing at Schilling Air Force Base, Kan. From August 1965 to October 1966, he was assigned as a mission planner with the newly established SR-71 unit, the 9th Strategic Reconnaissance Wing, Beale Air Force Base, Calif. The general then served as operations officer, 432nd Reconnaissance Technical Squadron, Udorn Royal Thai Air Force Base, Thailand.

After completing his Southeast Asia tour of duty in November 1967, General Moorman was assigned to the 497th Reconnaissance Technical Group, Schierstein, West Germany, as a reconnaissance intelligence staff officer. In November 1970, he transferred to the Air Force Special Projects Production Facility, Westover Air Force Base, Mass., first as the assistant director of evaluation and later as executive officer.

In August 1975, General Moorman served as the executive, then as deputy director of plans and programs, Office of Space Systems, Office of the Secretary of the Air Force, Washington, D.C., until August 1979. In June 1980, he was selected as deputy military assistant to the Secretary of the Air Force and served two secretaries. He was assigned to the North American Aerospace Defense Command, Cheyenne Mountain Complex, Colo., as director of space operations in August 1981.

In March 1982, he became deputy director, space defense, Office of the Deputy Chief of Staff for Plans at Peterson AFB, where he was deeply involved in the planning and organizing for the establishment of Air Force Space Command. General Moorman remained at Peterson and was named the first director, commander's group, for Air Force Space Command in August 1982. In July 1984, he became vice commander of the 1st Space Wing. In March 1985, he became director of space systems, Office of the Secretary of the Air Force.

In October 1987, General Moorman became director of Space and Strategic Defense Initiative programs, Office of the Assistant Secretary of the Air Force for Acquisition, at the Pentagon. He also represented the Air Force in the Strategic Defense Initiative program and was authorized to accept SDI program execution responsibilities on behalf of the Air Force. The general simultaneously held the position of special assistant for Strategic Defense Initiative to the Vice Commander of Air Force Systems Command at Andrews Air Force Base, Md. He assumed his present position on March 23, 1992.

The general's military awards and decorations include the Air Force Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit with one oak leaf cluster, Meritorious Service Medal with one oak leaf cluster, and Air Force Commendation Medal with one oak leaf cluster. He also wears the Master Space Badge.

He was promoted to lieutenant general on April 1, 1990.

General Moorman is married to the former Barbara Ann Stadler of Salina, Kan. They have two sons, Thomas S. III and John.
Major General Jay W. Kelley is the special assistant to the Commander, Air Force Space Command at Peterson AFB, CO

General Kelley was born on August 9, 1941, in Frankfort, Ind., and graduated from Frankfort High School in 1959. He enlisted in the Air Force Reserve in 1959, and in 1960 was selected to attend the U.S. Air Force Academy. He earned a bachelor's degree from the Academy in 1964, and a master of science degree from Auburn University in 1973. He graduated from Squadron Officer School in 1967, Air Command and Staff College in 1973, National War College in 1981, the program for senior executives in national and international security at the John F. Kennedy School of Government, Harvard University, in 1986 and the Massachusetts Institute of Technology program on foreign politics and national interest in 1987.

General Kelley was commissioned through the U.S. Air Force Academy in June 1964. He completed the Missile Launch Officer Course in October 1964, and was assigned to the 390th Strategic Missile Wing at Davis-Monthan AFB, Ariz., as a Titan II missile combat crew member and standardization officer. In June 1968, he transferred to the Re-Entry Systems Branch, Office of the Deputy Chief of Staff for Plans, Headquarters Strategic Air Command, at Offutt AFB, Neb. There he served as command project officer for the Minuteman III Re-Entry Vehicle System.

In July 1973, he was assigned to the Missile Tactics Branch, Joint Strategic Target Planning Staff, also at Offutt AFB, and then became chief of the Joint Strategic Target Planning Staff's Missile Tactics Division.

From June 1977 to October 1979, he served in the Operations Directorate, Strategic Operations Division, Organization of the Joint Chiefs of Staff, Washington, D.C. He then became the Air Force research associate at the International Institute for Strategic Studies at London, England.

In June 1981, General Kelley was assigned to Whiteman AFB, Mo., as the assistant deputy commander for operations, 351st Strategic Missile Wing. He became commander of the 351st Combat Support Group in June 1982.

The general served as commander of the 381st Strategic Missile Wing at McConnell AFB, Kan., from July 1983 to June 1985. Under his command, the 381st began deactivation of its Titan II intercontinental ballistic missiles and initiated planning for deployment of the B-1B bomber to Air Command at Offutt AFB. In June 1986, he was assigned as senior military advisor to the director of the U.S. Arms Control and Disarmament Agency, Washington, D.C. In April 1988, General Kelley was assigned to the Air Force Space Command at Peterson AFB as the assistant deputy chief of staff for plans. In July 1988, he became the deputy chief of staff for operations. He was reassigned as deputy chief of staff for plans in June 1989 and later became deputy chief of staff for requirements.

He assumed his present position 23 March 1992.

General Kelley wears the senior space badge and is a command missile officer. His military decorations and awards include the Defense Superior Service Medal, Legion of Merit, Defense Meritorious Service Medal, Meritorious Service Medal with one oak leaf cluster, Joint Service Commendation Medal and Combat Readiness Medal.

He was promoted to major general on June 1, 1990.

General Kelley is married to the former Martha Long of Frankfort. They have two daughters, Kristin and Kimberly.
WEDNESDAY, APRIL 22

PANEL SESSION II (8:30 a.m. to 11:30 a.m.)
Howard Johnson Plaza-Hotel, Challenger Main Ballroom

SPACE STATION
Panel Chairman: Richard H. Kohrs, Director, Space Station Freedom, NASA Headquarters, Washington, D.C.
Session Organizer: Dr. Earle K. Huckins, Director, Space Station Engineering, NASA Headquarters, Washington, D.C.

MEMBERS:
John W. Aaron, Manager, Space Station Projects Office, NASA, Johnson Space Center, TX
George D. Hopson, Manager, Space Station Projects Office, NASA, Marshall Space Flight Center, AL
J. R. (Dick) Lyon, Manager, Space Station Project Office, NASA, Kennedy Space Center, FL
Ronald L. Thomas, Director, Space Station Freedom, NASA, Lewis Research Center, OH

LUNCHEON (12:00 noon to 1:30 p.m.)
Holiday Inn, Manatee Room
Introductions: Frank Watkins
Speaker: Mr. Howard Benedict

Before Howard Benedict retired from The Associated Press on Feb. 28, 1990, he was senior aerospace writer for 31 of the 37 years he worked with the wire service. After assignments in Salt Lake City, New York City and Tampa, he became correspondent at Cape Canaveral, Fla., in 1959. With the space program slowing down after the Skylab program, he transferred to the Washington bureau in 1974. For two years during the Ford administration he was a White House correspondent.

In May 1984, with the space shuttle program accelerating, he returned to Cape Canaveral as correspondent. He covered more than 2,000 missile and rocket launchings and wrote the main stories on the first 65 U.S. astronauts. In 1982 he spent two weeks in the Soviet Union interviewing for a series of stories on the Russian space program.

He has received several writing awards, including two top AP reporting awards presented annually by The Associated Press Managing Editors Association. The first was in 1969 for his coverage of the Apollo moon flights. The second was in 1985 for his coverage of the space shuttle Challenger disaster. He also has twice received the National Space Club's "Media Award," in 1972 and 1990, has received 12 awards from the Aviation/Space Writers Association, including top space writing presentations in 1966, 1968, 1974, 1981, 1987, and 1989 and the Robert S. Ball Award in 1966 and 1968. He was the 1988 recipient of the association's Lauren Lyman Award, recognizing lifetime achievement.

Before joining The AP in 1953, he worked with the Sioux City, Iowa, Journal and with Pacific Stars & Stripes in Tokyo and Korea during the Korean War. He was born in Sioux City in 1928. He attended the Medill School of Journalism at Northwestern University.


Since March 1, 1990, Benedict has been executive director of the Mercury Seven Foundation.

PAPER SESSION II (2:00 p.m. to 5:00 p.m.)

A. SPACE STATION
Howard Johnson Plaza-Hotel, Atlantis/Discovery Rooms

Session Chairman: Robert W. Moorehead, Deputy Director, Space Station Freedom Program and Operations, Reston, VA
Session Organizer: Gert Adkins, McDonnell Douglas Space Systems Company, Kennedy Space Center, FL

1. SPACE STATION FREEDOM DMS HARDWARE
Carroll Dawson, Manager, Engineering/Integration Office, Space Station Freedom Program Office, NASA, Johnson Space Center, TX

2. THE TESTABILITY OF SOFTWARE FOR THE SPACE STATION FREEDOM PROGRAM
Joseph W. Devlin, Staff Engineer, Federal Sector Division, IBM, Space Station Integration & Test, Houston, TX
Lindell R. Small, Manager, DMS Integration & Test, Federal Sector Division, IBM, Space Station Integration & Test, Houston, TX
John G. McBride, Planned Solutions, Inc., Houston, TX

3. SPACE STATION ON-ORBIT SOLAR ARRAY LOADS DURING ASSEMBLY
Siamak Ghofranian, Sr. Dynamic Specialist, Rockwell International, Space Systems Division, Downey, CA
E. Fuji, Rockwell International, Space Systems Division, Downey, CA
C. R. Larson, Rockwell International, Space Systems Division, Downey, CA

4. DIMENSIONAL STABILITY OF THE ATTITUDE REFERENCE ASSEMBLY ON SPACE STATION FREEDOM
Fred Cutting, Sr. Project Staff Engineer, Honeywell Inc., Clearwater, FL
Merle Hubbard, Sr. Project Staff Engineer, Honeywell Inc., Clearwater, FL

5. MAGIK ROBOTICS SIMULATION: A WINDOW ON SPACE STATION FREEDOM
David A. Read, Engineer Specialist, McDonnell Douglas Space Systems Company, Houston, TX
6. SPACE STATION FREEDOM ECLSS  
Jack Hall, Sr. Systems Analyst, NASA, Space Station Freedom Program Office, Reston, VA

B. NATIONAL LAUNCH SYSTEM  
Howard Johnson Plaza-Hotel, Columbia/Enterprise Rooms

Session Chairman: G. Porter Bridwell, Manager, Heavy Lift Launch Vehicle Definition Office, NASA, Marshall Space Flight Center, Huntsville, AL
Session Organizer: Gary F. Letchworth, Lockheed Space Operations Company, Kennedy Space Center, FL

1. NATIONAL LAUNCH SYSTEM PAYLOAD ACCOMMODATIONS  
Capt. James M. Knauf, USAF, NLS Requirements Officer, Headquarters Air Force Space Command, Peterson AFB, CO

2. NATIONAL LAUNCH SYSTEM LAUNCH OPERATIONS  
Gary F. Letchworth, Advanced Programs Office, Lockheed Space Operations Co., Titusville, FL

3. AUTOMATED LAUNCH VEHICLE COMMAND & CONTROL CENTER  
Dr. Roger F. Block, Mgr., Advanced Programs, Honeywell Space & Strategic Systems Operations, Clearwater, FL  
Hoyt M. Layson, Sr. Project Staff Engineer, Honeywell Space & Strategic Systems Operations, Clearwater, FL  
David V. Wilson, Sr. Engineering Fellow, Honeywell Space & Strategic Systems Operations, Clearwater, FL

4. INTEGRATED FACTORY/LAUNCH SITE PROCESSING CONCEPT  
Jacob E. Huether, Rockwell International, Space Systems Division, Kennedy Space Center, FL  
Albert E. Otto, Rockwell International, Space Systems Division, Downey, CA

5. APPLICATION OF INFORMATION TECHNOLOGY TO THE NATIONAL LAUNCH SYSTEM  
W. Thad Mauldin, Mgr., Aerospace Projects, PRC, Inc., Huntsville, AL  
Carolyn L. Smith, Sr. Computer Analyst, PRC, Inc., Huntsville, AL  
Marty E. Smith, Advanced Software Team Leader, PRC, Inc., Huntsville, AL  
Steve Davis, Sr. Computer Analyst, PRC, Inc., Huntsville, AL  
Jan C. Monk, Chief Engineer, STME, NASA, Marshall Space Flight Center, Huntsville, AL

6. NLS COST-containing  

C. INTERSTELLAR INITIATIVES  
Holiday Inn, Manatee Room

Session Chairman: Dr. Steven A. Hawley, Associate Director, Ames Research Center, Moffett Field, CA
Session Organizer: Dr. Alan E. Drysdale, McDonnell Douglas Space Systems Company, Kennedy Space Center, FL

1. PIONEER 10 INTERSTELLAR STUDIES  
Dr. Palmer Dyal, Dep. Director of Space Research, NASA, Ames Research Center, CA

2. THE SEARCH FOR EXTRA TERRESTRIAL INTELLIGENCE  
Dr. John Billingham, Chief, SETI Office, NASA, Ames Research Center, CA

3. THE ROLE OF ADVANCED NUCLEAR PROPULSION SYSTEMS IN PRECURSOR INTERSTELLAR MISSIONS  
Dr. Joseph A. Angelo, Jr., Science Applications International Corp., Melbourne, FL  
David Buden, Center for Nuclear Engineering and Technology, Idaho National Engineering Laboratory, Idaho Falls, ID

4. HORIZON MISSIONS TECHNOLOGY STUDY  

5. LEGAL CHALLENGES IN REALIZING INTERSTELLAR INITIATIVES  
Suzanne Hodge, Rockwell International Corp., Space Systems Division, Kennedy Space Center, FL  
Manuel C. Urrutia, Rockwell International Corp., Space Systems Division, Kennedy Space Center, FL  
Elizabeth B. Osmond, Atty., Asst. State Attorney, Florida

EXHIBIT CENTER RECEPTION  
(6:00 p.m. to 7:30 p.m.)  
Cocoa Beach Hilton and Crossway Inn
**THURSDAY, APRIL 23**

**PANEL SESSION III (8:30 a.m. to 11:30 a.m.)**
Howard Johnson Plaza-Hotel, Challenger Main Ballroom

**DoD SPACE RESEARCH AND DEVELOPMENT**
Session Organizer: Capt. Spencer H. Levels, USAF, Space Shuttle Range Operations Officer, 45th Range Squadron, Patrick AFB, FL

**MEMBERS:**
The Honorable Martin C. Faga, Assistant Secretary of the Air Force for Space, Pentagon, Washington, D.C.
Maj. Gen. Donald J. Hard, USAF, Director of Space Programs, Assistant Secretary of the Air Force for Acquisition, Pentagon, Washington, D.C.
John A. McLuckey, President, Defense Electronics, Rockwell International Corporation, Ahaheim, CA

**PAPER SESSION III (1:00 p.m. to 4:00 p.m.)**

**A. DoD SPACE RESEARCH & DEVELOPMENT**
Howard Johnson Plaza-Hotel, Atlantis/Discovery Rooms

Session Chairman: Col. Norman H. Buchanan, USAF, Program Director, Upper Stages SPO, Space Systems Division, Los Angeles AFB, CA
Session Organizer: Capt. Richard Einstman, USAF, Space Shuttle Range Operations Officer, 45th Range Squadron, Patrick AFB, FL

1. THERMOPLASTIC COMPOSITES FOR SPACE APPLICATIONS — PROGRAM GOALS AND ACHIEVEMENTS FOR ADVANCED MATERIALS IN SDI SYSTEMS
   Geoffrey M. Wood, Oak Ridge National Laboratory, Oak Ridge, TN

2. ARTIFICIAL EXPERTISE IN SYSTEMS ENGINEERING
   Daniela T. Iorgulescu, Martin Marietta Astronautics Group, Denver, CO
   Carol S. Giffen, Martin Marietta Astronautics Group, Denver, CO
   David F. Giere, Martin Marietta Astronautics Group, Denver, CO

3. ON-ORBIT CHARACTERIZATION OF ELECTRIC PROPULSION IN LEO SATELLITES
   David Barnhart, Phillips Laboratory, Edwards AFB, CA
   J. Sankovic, NASA, Lewis Research Center, OH

4. ENVIRONMENTAL SENSITIVITIES OF THE COMBINED RELEASE AND RADIATION EFFECTS SATELLITE (CRRES)
   Capt. Eric Hattfield, USAF, Staff Meteorologist, Consolidated Space Test Center, Onizuka AFB, CA

5. ANTI-SATELLITE (ASAT) WEAPONS
   Col. Barker, USAF, Headquarters Air Force Space Command, Peterson AFB, CO.

**B. SPACE EXPLORATION INITIATIVE**
Howard Johnson Plaza-Hotel, Columbia/Enterprise Rooms

Session Chairman: Dr. Michael Griffin, Associate Administrator, Office of Exploration, NASA, Washington, D.C.
Session Organizer: Suzanne Hodge, Rockwell International Corporation, Cape Canaveral, FL

1. SPACE EXPLORATION INITIATIVE LOGISTICS SUPPORT — LESSONS FROM THE DoD
   John R. Cox, Air Force Space Systems Division, Los Angeles AFB, CA
   Walbert G. McCoy, U.S. Space Command, Peterson AFB, CO
   Terence Jenkins, PRC Incorporated, El Segundo, CA

2. IN-SPACE OPERATIONS DRIVEN MARSTransfer Vehicle SYSTEM
   Henry H. Woo, Rockwell International, Space Systems Division, Downey, CA
   Ron Waldwell, Rockwell International, Space Systems Division, Downey, CA
   W. Brimley, Spar Aerospace Ltd., Weston, Ontario, Canada

3. MARS TRANSPORTATION SYSTEM SYNTHESIS
   Archie C. Young, Mission Analysis Branch, NASA, Marshall Space Flight Center, AL
   John A. Mulqueen, Mission Analysis Branch, Marshall Space Flight Center, AL
   William J. Emrich, Mission Analysis Branch, NASA, Marshall Space Flight Center, AL

4. CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS) MODELING
   Dr. Alan Drysdale, McDonnell Douglas Space Systems Co., Kennedy Space Center, FL
   Mark Thomas, McDonnell Douglas Space Systems Co., Kennedy Space Center, FL
   Mark Fresa, McDonnell Douglas Space Systems Co., Kennedy Space Center, FL

5. LIFE SUPPORT RESEARCH & DEVELOPMENT FOR THE DEPARTMENT OF ENERGY SPACE EXPLORATION INITIATIVE
   Charles D. Scott, Oak Ridge National Laboratory, Oak Ridge, TN
   Lamar J. Johnson, Idaho National Engineering Laboratory, Idaho Falls, ID
   William W. Schertz, Argonne National Laboratory, Argonne, IL
   James A. Wise, Pacific Northwest Laboratory, Richland, WA
   Charles E. Wyman, National Renewable Energy Laboratory, Golden, CO

6. JOURNEY INTO TOMORROW: DEVELOPING NUCLEAR PROPULSION FOR THE SPACE EXPLORATION INITIATIVE
   Kathleen F. Harer, NASA, Kennedy Space Center, FL
   Scott R. Graham, NASA, Kennedy Space Center, FL
   Gary L. Bennet, NASA, Kennedy Space Center, FL
C. COMMERCIAL SPACE DEVELOPMENT
Holiday Inn, Manatee Room

Session Chairman: James T. Rose, Former Assistant Administrator, Office of Commercial Programs, NASA, Washington, D.C.
Session Organizer: George Mosakowski, NASA, Kennedy Space Center, FL

1. THE COMMERCIAL DEVELOPMENT OF SPACE AND THE FEDERAL REGULATORY PROCESS
Linda Hull Strine, Deputy Associate Director, Program Affairs, Office of Commercial Space Transportation, U.S. Department of Transportation, Washington, D.C.
Carissa Bryce Christensen, Vice President, Princeton Synergetics, Inc., Washington, D.C.

2. NASA’S COMMERCIAL SPACE PROGRAM
Richard H. Ott, Director, Commercial Development Division, NASA, Office of Commercial Programs, Washington, D.C.

3. AIR FORCE SUPPORT FOR COMMERCIAL SPACE LAUNCHES
Major Victor J. Villhard, USAF, Chief, Commercial Services Branch, Headquarters Air Force Space Command, Peterson AFB, CO

4. COMMERCIAL MATERIALS PROCESSING IN SPACE: ACCESS IS THE KEY
Russell J. Hannigan, EUROSPACE, France
David C. Webb, International Hypersonic Research Institute, Winter Springs, FL

5. LOW COST ACCESS TO SPACE WITH THE STARFIRE/CONESTOGA LAUNCH VEHICLE SYSTEMS
Donald Slayton, Director, Space Services Division, EER Systems Corporation, Seabrook, MD

6. COMET: DEVELOPED TECHNOLOGIES FACILITATE ACTIVATION
Joseph F. Pawlick, Jr., COMET Program Manager, UT-Calspan Center for Space Transportation and Applied Research, Tullahoma, TN

7. SPACE: IT’S NOT JUST FOR GOVERNMENTS ANYMORE
Dr. Barbara A. Stone, Director, Plans, Policy & Evaluation Division, Office of Commercial Programs, NASA, Washington, D.C.
Dr. Peter Kleber, Manager, Industrialization of Space, German Aerospace Research Establishment, Cologne, Germany

8. POTENTIAL EFFECTS OF THE SOVIET BREAKUP ON U.S. COMMERCIAL SPACE
Lee Scherer, General Dynamics, Commercial Launch Services, San Diego, CA

SPACE CONGRESS RECEPTION (6:00 p.m. to 8:00 p.m.)
Holiday Inn, Observation Deck

PANEL SESSION IV (7:00 p.m. to 9:00 p.m.)
Howard Johnson Plaza-Hotel, Challenger Main Ballroom

MEET THE ASTRONAUTS
Panel Chairman: Robert L. Crippen, Center Director, NASA, John F. Kennedy Space Center, FL
Astronauts: As available between training commitments.
PROGRAM SUMMARY

MONDAY, APRIL 20
12:00 noon to 5:00 p.m.
REGISTRATION DESK OPEN, Holiday Inn, Dolphin Room

TUESDAY, APRIL 21
7:00 a.m. to 5:00 p.m.
REGISTRATION DESK OPEN, Holiday Inn, Dolphin Room
8:30 a.m.
KEYNOTE ADDRESS, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
9:00 a.m. to 11:30 a.m.
PANEL SESSION I: DoD SPACE OPERATIONS, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
11:00 a.m. to 7:00 p.m.
YOUTH SCIENCE FAIR, Holiday Inn, Dolphin Room
11:00 a.m. to 7:00 p.m.
EXHIBITS, Cocoa Beach Hilton and Crossway Inn
12:00 noon to 1:30 p.m.
LUNCHEON, Holiday Inn, Manatee Room
2:00 p.m. to 5:00 p.m.
PAPER SESSION I:
A. DoD SPACE OPERATIONS, Howard Johnson Plaza-Hotel, Atlantis/Discovery Rooms
B. SPACE SHUTTLE & PAYLOADS, Howard Johnson Plaza-Hotel, Columbia/Enterprise Rooms
C. SPACE EDUCATION, Holiday Inn, Manatee Room
7:00 p.m.
BANQUET SOCIAL HOUR, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
8:00 p.m.
BANQUET, Howard Johnson Plaza-Hotel, Challenger Main Ballroom

WEDNESDAY, APRIL 22
7:00 a.m. to 5:00 p.m.
REGISTRATION DESK OPEN, Holiday Inn, Dolphin Room
8:30 a.m. to 11:30 a.m.
PANEL SESSION II: SPACE STATION, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
11:00 a.m. to 8:00 p.m.
EXHIBITS, Cocoa Beach Hilton and Crossway Inn
12:00 noon to 8:00 p.m.
YOUTH SCIENCE FAIR, Holiday Inn, Dolphin Room
12:00 noon to 1:30 p.m.
LUNCHEON, Holiday Inn, Manatee Room

THURSDAY, APRIL 23
7:00 a.m. to 5:00 p.m.
REGISTRATION DESK OPEN, Holiday Inn, Dolphin Room
8:30 a.m. to 11:30 a.m.
PANEL SESSION III: DoD SPACE RESEARCH AND DEVELOPMENT, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
11:00 a.m. to 1:00 p.m.
YOUTH SCIENCE FAIR, Holiday Inn, Dolphin Room
11:00 a.m. to 3:00 p.m.
EXHIBITS, Cocoa Beach Hilton and Crossway Inn
1:00 p.m. to 4:00 p.m.
PAPER SESSION III:
A. DoD SPACE RESEARCH & DEVELOPMENT, Howard Johnson Plaza-Hotel, Atlantis/Discovery Rooms
B. SPACE EXPLORATION INITIATIVE, Howard Johnson Plaza-Hotel, Columbia/Enterprise Rooms
C. COMMERCIAL SPACE DEVELOPMENT, Holiday Inn, Manatee Room
6:00 p.m. to 8:00 p.m.
SPACE CONGRESS RECEPTION, Holiday Inn, Observation Deck
7:00 p.m. to 9:00 p.m.
PANEL SESSION IV: MEET THE ASTRONAUTS, Howard Johnson Plaza-Hotel, Challenger Main Ballroom

FRIDAY, APRIL 24
7:00 a.m. to 12:00 noon
REGISTRATION DESK OPEN, Holiday Inn, Dolphin Room
8:30 a.m. to 11:30 a.m.
PANEL SESSION V: NASA SPACE TECHNOLOGY, Howard Johnson Plaza-Hotel, Challenger Main Ballroom
11:00 a.m. to 5:30 p.m.
SPACE CONGRESS GOLF TOURNAMENT, Patrick AFB, Golf Course
8:30 p.m. to 9:30 p.m.
PIONEERS' ANNUAL BANQUET, Patrick AFB, Officers' Club
ACKNOWLEDGEMENTS

The Twenty-Ninth Space Congress gratefully acknowledges the special support of the following organizations:

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