

SPACE STATION

Memorandum of Understanding
Between the
UNITED STATES OF AMERICA
and the EUROPEAN SPACE AGENCY

Signed at Washington and Paris
March 11 and 18, 1997



NOTE BY THE DEPARTMENT OF STATE

Pursuant to Public Law 89-497, approved July 8, 1966 (80 Stat. 271; 1 U.S.C. 113)—

“ . . . the Treaties and Other International Acts Series issued under the authority of the Secretary of State shall be competent evidence . . . of the treaties, international agreements other than treaties, and proclamations by the President of such treaties and international agreements other than treaties, as the case may be, therein contained, in all the courts of law and equity and of maritime jurisdiction, and in all the tribunals and public offices of the United States, and of the several States, without any further proof or authentication thereof.”

EUROPEAN SPACE AGENCY

Space Cooperation

*Memorandum of understanding signed at Washington
and Paris March 11 and 18, 1997;
Entered into force March 18, 1997.*

**MEMORANDUM OF UNDERSTANDING
BETWEEN THE
UNITED STATES
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND THE
EUROPEAN SPACE AGENCY
ENABLING EARLY UTILIZATION OPPORTUNITIES OF
THE INTERNATIONAL SPACE STATION**

The United States National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) (hereinafter referred to as "the Parties"),

Recalling the NASA Administrator's offer at the November 1993 Heads of Agency meeting in Montreal, Canada, to seek mutually beneficial opportunities to cooperate in Phases 1, 2, and 3 of the International Space Station program,

Recalling the subscription on July 19, 1994 by Member States of ESA of the additional Declaration to the Columbus Program on early delivery to NASA of Space Station items,

Recalling the *Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station* (IGA) signed on September 29, 1988, which has not yet entered into force for the European Partner,

Recalling the *Memorandum of Understanding Between the United States National Aeronautics and Space Administration and the European Space Agency on Cooperation in the Detailed Design, Development, Operation and Utilization of the Permanently Manned Civil Space Station (Space Station MOU)* signed on September 29, 1988, in particular the provisions of Articles 4.1, 8.3.a.2 and 8.3.k, which anticipate barter, purchase, or other arrangements between partners for obtaining additional Space Station utilization opportunities,

Recalling the NASA/ESA "Early Utilization Agreement in Principle" signed on May 6, 1994.

Recognizing that NASA and ESA have a mutual interest in utilization activities in the early phases of the Space Station program,

Considering ESA's interest in Space Station utilization accommodations and resources, and specified Space Shuttle flight crew opportunities, prior to the on-orbit assembly and verification of the European pressurized laboratory; and NASA's interest in specified infrastructure equipment to enhance the early utilization capability of the Space Station,

Have agreed as follows:

ARTICLE 1 -- Purpose

- 1.1 The purpose of this MOU is to establish arrangements between NASA and ESA for the provision by NASA to ESA of early utilization opportunities during Phases 1, 2, and 3 of the International Space Station (ISS) program prior to the on-orbit assembly and verification of the European pressurized laboratory, as well as specified Space Shuttle opportunities, as indicated in Article 2, in exchange for the provision by ESA to NASA of the Space Station utilization enhancement items described in Article 3.
- 1.2 The specific objectives of this MOU are to:
 - (a) record the mutual commitments and detail the respective roles and responsibilities of the Parties in this cooperation;
 - (b) establish, consistent with Article 5 below, the program management structure and interfaces necessary to ensure effective planning and coordination in the conduct of the activities in accordance with this MOU; and,
 - (c) increase the overall expertise of the Parties and improve their capabilities in order to better prepare for the utilization and operation of the international Space Station.
- 1.3 The Parties intend this MOU to be consistent with the provisions of the Agreement on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station (1988 IGA) and the NASA-ESA Memorandum of Understanding on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station (1988 MOU), both done at Washington on 29 September 1988. All cooperation between the Parties under this MOU will be carried out consistent with the provisions of those agreements. It is contemplated by the Parties that a new Intergovernmental Agreement will supersede the 1988 IGA and that a new Memorandum of Understanding on

Space Station cooperation between NASA and ESA will supersede the 1988 MOU. When the new agreements enter into force, all cooperation between the Parties under this MOU will be carried out consistent with the provisions of those new agreements. Until the 1988 agreements are superseded, in the event there is any conflict between the provisions of this MOU and the 1988 agreements, such conflict shall be resolved by giving precedence to the 1988 agreements. Once the new Intergovernmental Agreement and the new Space Station Memorandum of Understanding have superseded the original agreements, in the event of a conflict between the provisions of this MOU and the new agreements, such conflict shall be resolved by giving precedence to those new agreements.

ARTICLE 2 -- ESA Early Utilization

2.1 NASA, using all reasonable efforts, will provide ESA the following early utilization opportunities in exchange for ESA's provision of the Space Station utilization enhancement items described in Article 3. These early utilization opportunities will be compatible with NASA's utilization of the ISS:

2.1.1 Access by ESA to 50% of the experiment module accommodations in a NASA payload rack in the U.S. Laboratory for a period of 2 years for use by an experiment module or modules provided by ESA through a cooperative research agreement between NASA and ESA.

2.1.2 The accommodation of European-provided research equipment in a U.S. research facility or facilities, in addition to that access provided in 2.1.1 above, for a period of 2 years. The experiment volume to be made available will be the equivalent of up to four mid-deck lockers. This accommodation will occur through a cooperative research agreement between NASA and ESA.

2.1.3 The conduct of research, including Earth and/or space viewing research, using one-half of one attached payload accommodation site on the truss from the first availability of such a site and a suitable launch opportunity for a period of 3 years.

For the ESA-provided payloads thus accommodated, NASA will provide ESA with a commensurate share of utilization resources. If these payloads are not part of a cooperative program with NASA, ESA will be provided the option to purchase a commensu-

rate share of supporting services (data transmission and transportation).

- 2.1.4 Provision of two Space Shuttle flight opportunities for ESA astronauts to be accommodated in the Phase 1 program and/or that portion of Phase 2/3 prior to the on-orbit assembly and verification of the European pressurized laboratory.
- 2.2 The cooperative research agreements cited in subparagraphs 2.1.1 and 2.1.2 above will be consistent with the mechanisms established by multilateral research discipline planning groups, will reflect the mutual scientific, technical and programmatic interests of NASA and ESA, and will be within the known scientific, technical, and budgetary capabilities of both Parties. NASA and ESA will each assume full financial responsibility for its respective commitments such that there is no exchange of funds between them. Unless otherwise agreed, the research disciplines to be considered under these cooperative agreements will be within the areas of responsibility of NASA's Office of Life and Microgravity Sciences and Applications and the ESA Directorate for Manned Spaceflight and Microgravity.
- 2.3 ESA's access to the pressurized payload accommodations described in subparagraphs 2.1.1 and 2.1.2 is targeted to commence no later than November 2000 in order to satisfy the intent of this MOU to provide ESA with these utilization opportunities prior to the on-orbit assembly of the European pressurized laboratory. Specific flight dates will be documented and updated as necessary in the cooperative research agreements described in paragraph 2.2, and controlled in the U.S. Partner Utilization Plan for ISS.
- 2.4 In order to ensure that European-provided payloads referred to in paragraph 2.1 are compatible with the U.S. Laboratory interfaces, and with external payloads-to-Station interfaces in the case of European-provided external payloads, NASA will:
 - 2.4.1 Provide ESA with necessary interface information.
 - 2.4.2 Provide ESA with standard integration services free of charge.
 - 2.4.3 For pressurized payloads, grant ESA access to appropriate interface simulators in the United States, enabling verification and checkout of the ESA-provided payloads.

- 2.4.4 For unpressurized payloads, grant ESA procurement rights to the appropriate interface simulators enabling verification and checkout of the ESA-provided payloads.
 - 2.4.5 For unpressurized payloads, grant ESA access to 3 EXPRESS Pallet Adapters at the ESA payload development site. The schedule for delivery of these adapters will be documented in an appropriate payload integration agreement.
 - 2.4.6 Conduct, prior to flight, with ESA participation, a post-shipment review of the EXPRESS Pallet Adapters with ESA's integrated payloads, as described in the appropriate payload integration agreement.
- 2.5 While under ESA's control, ESA will assume responsibility for the 3 EXPRESS Pallet Adapters referred to in subparagraph 2.4.5. Accordingly, ESA will:
- 2.5.1 Bear the risk of loss or damage of the hardware while it is in ESA's control.
 - 2.5.2 Assume the cost of shipping the hardware to Europe and returning it to the United States.
 - 2.5.3 Upon completion of the on-orbit operations, and with NASA participation, be responsible for EXPRESS Pallet Adapters deintegration and refurbishment, and reflight certification.

ARTICLE 3 -- Space Station Utilization Enhancements Items

- 3.1 **Deliverable Items.** ESA, using all reasonable efforts, will provide to NASA the following utilization enhancement items, consistent with the target delivery lead times and launch readiness dates specified below. These target lead times and launch readiness dates may be changed only with the Parties' agreement. ESA will deliver all items, including item-specific Ground Support Equipment (GSE) to NASA installations in the United States as specified in the detailed implementation plans referred to in subparagraph 3.3.5 and provide support as specified in subparagraph 3.3.3.

3.1.1 Microgravity Glovebox.

- 3.1.1.1 Flight Unit. The flight unit will be produced according to NASA functional requirements and performance specifications, including those for provision of a video system, fully integrated into an ESA-provided flight rack that meets International Standard Payload Rack (ISPR) specifications and interface requirements. The fully integrated flight unit will be delivered no later than six months before the launch readiness date of December 2000.
- 3.1.1.2 Ground Unit. The ground unit will be a functional simulator dedicated to protocol development and experiment testing. It will be functionally equivalent to the flight unit and all of the experiment and crew interfaces to the ground unit shall be high-fidelity. The ground unit will be supported by sufficient configuration documentation to allow NASA configuration control and maintenance of the unit. The ground unit will be delivered no later than 18 months before launch readiness date.
- 3.1.1.3 Training Unit. The training unit will be a mock-up unit supporting whole Station training, including malfunction simulation and front panel crew interfaces. The training unit will be supported by sufficient configuration documentation to allow NASA configuration control and maintenance of the unit. The training unit will be delivered no later than 18 months before launch readiness date.
- 3.1.1.4 Engineering Unit. The engineering unit will be of sufficiently high fidelity to support sustaining engineering functions such as anomaly resolution (hardware and software) and verification of system operational changes during on-orbit operations. To achieve this objective all functions, interfaces and hardware configuration shall be flight identical. The engineering unit, will be delivered to NASA upon the on-orbit acceptance and verification of the flight unit, unless otherwise agreed.

3.1.2 Freezers (Minus 80 Degree Celsius).

- 3.1.2.1 Flight Units. A total of three flight units will be produced according to NASA functional requirements and performance specifications, fully integrated into ESA-provided flight racks that meet ISPR specifications and interface requirements. The three flight units will be used for logistics purposes to transport thermally controlled items between the ground and the Space Station. Each flight unit will be delivered no later than six months before its respective launch readiness date:

<u>Flight Unit</u>	<u>Launch Readiness Date</u>
First Unit	August 1999
Second Unit	December 2000
Third Unit	September 2001

The capacity of each flight unit will be at least 0.3 cubic meters of refrigerated volume.

- 3.1.2.2 Ground Unit. The ground unit is to accurately represent the thermal conditioning characteristics of the flight unit for experiment ground testing, development and verification of science protocols and in-flight procedures. The unit will provide high fidelity crew interfaces limited to those required to meet these objectives. The ground unit will be delivered no later than 18 months before to the launch readiness date of the first flight unit.

- 3.1.2.3 Training Unit 1. The training unit will be a flight-like mock-up unit of the front panel crew interfaces with simulation of all data displays, including malfunction simulation for crew and ground controllers. The software simulator must be able to interface with Space Station Training Facility. The first training unit will be delivered no later than 18 months before the launch readiness date of the first flight unit.

Training Unit 2. The training unit will be an operator-interface high fidelity mock-up unit to support hands on training including, in-flight maintenance procedure, repair due to malfunctions, safing, replacing Orbital Replacement Units (ORU's), and installation/deinstallation procedures of the freezer. The training unit will be supported by sufficient configuration documentation to allow NASA configuration control and maintenance of the unit. The second training unit

will be delivered no later than 18 months before the launch readiness date of the first flight unit.

- 3.1.2.4 Engineering Unit. The engineering unit will be of sufficiently high fidelity to support sustaining engineering functions such as anomaly resolution (hardware and software) and verification of system operational changes during on-orbit operations. The engineering unit will be delivered to NASA upon the on-orbit and ground acceptance and verification of the flight units, unless otherwise agreed.

3.1.3 **Hexapod Pointing System.**

- 3.1.3.1 Flight Unit. The flight unit will be produced according to NASA functional requirements and performance specifications and verified to meet NASA requirements for acceptance and flight. The flight unit will be delivered no later than 12 months before the launch readiness date for SAGE III, but not earlier than January 2000.
- 3.1.3.2 Simulators. ESA will provide the following simulators of the Hexapod: (a) a low-fidelity simulator with geometry and mass characteristics suitable to support neutral buoyancy testing and crew training at Johnson Space Center for installation and servicing activities involving the remote manipulator system and/or extravehicular activity; and (b) a high fidelity partial simulator to verify mechanical interface between hexapod and science instrument (e.g., SAGE III); and to verify data system interfaces. All simulators will be delivered no later than mid-1998.
- 3.1.3.3 Engineering Unit. The engineering unit will be of sufficiently high fidelity to support sustaining engineering functions such as anomaly resolution (hardware and software) and verification of system operational changes during on-orbit operations. The engineering unit will be delivered to NASA upon the on-orbit acceptance and verification of the flight unit, unless otherwise agreed.

3.1.4 **ESA Mission Data Base system.**

- 3.1.4.1 Mission Data Base. ESA will deliver to NASA, for the sole purpose of International Space Station cooperation, the ESA Mission Data Base (MDB) software as developed by the ESA contractors as part of the ESA Columbus program, for use in the NASA Mission Build Facility. The software will include a number of agreed special extensions to meet specific NASA needs with respect to the use at the Mission Build Facility and will also include all necessary documentation and training, in support of use of the MDB software by NASA contractors. The MDB is a ground software tool which provides a central repository for all software and data products as well as the tools to perform configuration management, consistency testing and to maintain security of these products. The products which can be stored and managed by the MDB software include the flight element configuration definition, the flight software, flight procedures, displays, telemetry and command definition.
- 3.1.4.2 The MDB software is part of the Columbus Ground Software (CGS) and is produced according to the Columbus CGS Assembly Requirement Specification SPE 1214 597 Issue 1, of February 7, 1994. This original CGS specification is extended with the additional functional requirements as agreed for MDB utilization as part of the Mission Build Facility and is released as Issue 4, dated October 20, 1994.
- 3.1.4.3 The delivery to NASA of the MDB Software was in the form of incremental deliveries starting with V2.1 in December 1994 through the final version V3 in December 1995 and included training and technical support up to the end of 1995.
- 3.1.4.4 Columbus Ground Software. ESA will make available free of charge to NASA, for the sole purpose of International Space Station cooperation, the basic CGS as developed by ESA contractors as part of the ESA Columbus program as defined by the baseline CGS technical specification referred to in subparagraph 3.1.4.2.
- 3.1.4.5 ESA assisted NASA in the initial replan activities (end 1994/early 1995) required to incorporate the CGS into the Software

Verification Facility (SVF) baseline. ESA will maintain the basic CGS product and will make available to NASA, for the sole purpose of International Space Station cooperation, a copy of each new version of the CGS free of charge.

- 3.2 **Delivery Schedules.** The delivery dates cited in subparagraphs 3.1.1, 3.1.2 and 3.1.3 are target dates consistent with the International Space Station Assembly Sequence Revision B, dated September 26, 1996. Delivery dates will be updated as necessary and controlled in the respective implementation plans for each of the applicable ESA-provided utilization enhancement items, as required in subparagraph 3.3.5.

3.3 **Additional ESA Responsibilities.**

- 3.3.1 **Reliability and Maintainability.** ESA will design and develop each utilization enhancement item, other than the hexapod, to achieve 10 years of useful operational life for flight units, through a strategy of reliability, maintenance, replacement, or some combination thereof. For the hexapod, ESA will design and develop for 5 years of useful operational life without scheduled maintenance or replacement.

- 3.3.2 **Item-Specific GSE.** ESA will make available item-specific GSE necessary to support ground operations as specified in the respective implementation plans.

- 3.3.3 **Training, Operational Support, Maintenance, and Sustaining Engineering.**

For each utilization enhancement item which entails delivery of flight units, ESA will provide maintenance procedures and an initial set of spares, as agreed in the respective implementation plans.

ESA will provide, until the time of successful on-orbit acceptance and verification of the utilization enhancement items, as agreed in the respective implementation plans, the following: training support, post shipment check out and acceptance support in the United States, launch support as necessary, and sustaining engineering.

For the time thereafter, ESA will ensure that engineering support and spare items can be procured by NASA in Europe under the same conditions as would be applied to ESA.

If such items required by NASA are not available to NASA in accordance with agreed specifications and schedules and at reasonable prices to be agreed, NASA shall be free to produce such units in the United States. For this purpose, ESA will ensure the availability of the necessary licensing arrangements. NASA will give ESA, and ESA's contractors, advance notice of any prospective requirements for follow on procurement or upgrade concerning the deliverable items provided by ESA, so as to provide ESA, and its contractors, with an opportunity, consistent with applicable procurement laws and regulations, to make proposals which meet such requirements.

3.3.4 While under ESA's control, ESA will assume the responsibility for the simulators referred to in subparagraph 3.4.1. In addition, ESA will assume the cost of shipping the simulators to and from Europe.

3.3.5 **Documentation.** ESA will provide complete and timely documentation, in accordance with requirements as specified in the respective implementation plans, to support, as necessary, analytical integration, safety assurance, acceptance and verification procedures for flight units, post-delivery prelaunch processing, transportation to orbit, on-orbit integration and operations, and maintenance.

For each utilization enhancement item, ESA, in coordination with NASA, will develop implementation plans that will incorporate the following:

- (a) NASA performance specifications and functional requirements;
- (b) top-level development schedules, including agreed-to project design, acceptance, and readiness reviews;
- (c) lists of deliverable items including quantities, delivery dates, and delivery locations;

- (d) itemization of any NASA-provided components or support;
- (e) provisions for on-orbit acceptance and verification;
- (f) other provisions as deemed necessary by NASA or ESA to define its respective roles and responsibilities.

The implementation plans will be agreed to by representatives of NASA and ESA as designated in accordance with Article 5.

3.4 NASA Responsibilities.

3.4.1 **NASA Furnished Equipment.** NASA will grant ESA access in Europe to appropriate interface simulators enabling verification and check-out of the enhancement items referred to in subparagraphs 3.1.1 to 3.1.3.

3.4.2 NASA will perform, on the ground and on orbit as appropriate, operational activities related to the ESA-provided utilization enhancement items and related ground units, including their prelaunch processing and their launch and verification on orbit, as described in the relevant implementation plans.

In order to minimize ESA's on-site support, NASA will ensure that such operational activities are carried out by personnel appropriately trained and in compliance with handling and other instructions referred to in the relevant implementation plans.

3.4.3 **Documentation.** NASA will provide complete and timely documentation to support the design and implementation of all the interface accommodations and operation aspects relevant to the enhancement items referred to in subparagraphs 3.1.1 to 3.1.3.

3.4.4 NASA will maintain and repair failed ORU's and ground systems (flight units and training units) using maintenance procedures and initial spares provided by ESA. Follow-on spares support will be provided by NASA.

3.5 **Sharing of Enhancement Items.** After ownership is transferred to NASA, the flight units of the Microgravity Glovebox and the Freezers described in subparagraphs 3.1.1 and 3.1.2 above will become part of the NASA-provided Laboratory Support Equipment for the ISS. As such, these items will

be available, on a noninterference basis with U.S. utilization, for preplanned user activities of other Partners, including ESA, at any location within the Space Station for the life of the International Space Station program. Use of this equipment will be scheduled as part of payload operations plans. Procedures for accounting for the resources required for the use of this equipment will follow those established for payloads. Alternately, cooperative agreements may be reached between NASA and other Partners, including ESA, enabling use of this equipment without accounting for resource utilization.

ARTICLE 4 -- Acceptance, Verification and Ownership

- 4.1. Prior to shipping each utilization enhancement item, ESA, with NASA participation, will conduct a preacceptance review in Europe, as described in the implementation plans. After shipment of the items to the United States, a postshipment check-out will take place with the support of ESA.
- 4.2. Upon completion of on orbit acceptance and verification of the hexapod and glovebox, as described in the respective implementation plans, ESA will transfer ownership of each such item and related ground units to NASA and the Parties will provide each other appropriate legal documentation evidencing such transfer. In the case of the freezer, ownership of each flight unit will be transferred upon completion of the on-orbit acceptance and verification of that unit. Ownership of the third freezer flight unit will be transferred in any case no later than 12 months after its delivery. Ownership of the freezer ground units will be transferred upon completion of the on-orbit acceptance and verification of the first flight unit.
- 4.3. Item unique GSE provided by ESA shall become the property of NASA at the time the corresponding utilization enhancement item becomes the property of NASA, or for the freezer, at the time the last flight unit becomes the property of NASA.
- 4.4. Generic GSE provided by one Party to the other pursuant to this MOU shall remain the provider's property, or the provider's contractors' and subcontractors' property, as the case may be, except as otherwise provided in specific arrangements to be concluded between the Parties or their respective contractors or subcontractors.

ARTICLE 5 -- Management

- 5.1 The glovebox, hexapod, freezer, and MDB programs will be implemented through a joint effort by each Party's designated technical point of contact. ESA will retain full responsibility for the management of the industrial contracts concluded with European industries for phase C/D. ESA will invite NASA representatives to participate in all formal reviews during phase C/D of the enhancement items referred to in Article 3. A detailed implementation plan for each utilization enhancement item will be developed and agreed to by the corresponding NASA and ESA technical points of contact. The implementation plans will define the detailed implementing arrangements for the undertakings herein. The implementation plans will reference the applicable documentation for the program, detailed hardware specifications, management requirements and procedures, program implementation schedule, and the specific responsibilities of the respective offices involved in the projects. Changes to the plans may be proposed by either Party, but will only be incorporated with the mutual approval of the NASA and ESA technical points of contact.
- 5.2 Consistent with the Parties' rights and obligations under this MOU, ESA's accommodations and resource allocations will be incorporated in the NASA Partner Utilization Plan and submitted to the Space Station User Operations Panel pursuant to Article 8 of the Space Station MOU. NASA will represent ESA with respect to the utilization rights obtained by ESA under this MOU.
- 5.3 The Parties will keep each other informed in a timely manner of any event that may prevent orderly implementation of the undertakings outlined in this MOU, so that any necessary adjustments can be made.
- 5.4 The Parties will each designate an MOU coordinator and a point of contact for each utilization enhancement item. These points of contact may be substituted by the respective Parties as appropriate.

Article 6 -- Cross-Waiver of Liability

- 6.1 The objective of this section is to establish a cross-waiver of liability ("cross-waiver") by the Parties and related entities in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the Space Station. This cross waiver of liability shall be broadly construed to achieve this objective.

In the event that a flight opportunity for an ESA astronaut under this MOU occurs on a Space Shuttle flight during the Phase 1 program, the cross-waiver of liability required for Space Shuttle flights, and not the cross-waiver set forth below, will govern the allocation of risk between the United States Government and ESA. In such event, the Parties will adopt appropriate legal arrangements to put into effect the applicable Space Shuttle cross-waiver.

6.2 For the purposes of this Article, the term:

(a) "Damage" means:

- (1) bodily injury to, or other impairment of health of, or death of, any person;
- (2) damage to, loss of, or loss of use of any property;
- (3) loss of revenue or profits; or
- (4) other direct, indirect, or consequential damage.

(b) "Launch vehicle" means an object (or any part thereof) intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.

(c) "Partner State" means each contracting Party for which the "Agreement among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station," or any superseding agreement (either agreement herein referred to as the "Intergovernmental Agreement" or "IGA"), has entered into force. A Partner State includes its Cooperating Agency as defined by Article 4 of the Intergovernmental Agreement. It also includes the National Space Development Agency of Japan.

(d) "Payload" means all property to be flown or used on or in a launch vehicle or the Space Station.

(e) "Protected Space Operations" means all launch vehicle activities, ISS activities, and payload activities on Earth, in outer space, or in transit between Earth and outer space done in implementation of the IGA, the Space Station MOU's and implementing arrangements pursuant to Article 4.2 of the IGA. It includes, but is not limited to:

- (1) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles, the Space Station, or a payload, as well as related support equipment and facilities and services; and
- (2) all activities related to ground support, test, training, simulation, or guidance and control equipment, and related facilities or services.

"Protected Space Operations" excludes activities on Earth which are conducted on return from the Space Station to develop further a payload's product or process for use other than for Space Station-related activities in implementation of the IGA, the Space Station MOU's and implementing arrangements pursuant to Article 4.2 of the IGA.

(f) "Related entity" means:

- (1) a contractor or subcontractor of a Party or a Partner State at any tier;
- (2) a user or customer of a Party or a Partner State;
- (3) a contractor, subcontractor, or financial assistance recipient of a user or customer of a Party or a Partner State at any tier.

The term "related entity" includes the Russian Space Agency, the Canadian Space Agency, and their related entities, until such time as the Government of the Russian Federation and the Government of Canada, respectively, become Partner States under the Intergovernmental Agreement. The term "contractors" and "subcontractors" include suppliers of any kind.

This subparagraph may also apply to a State, or an agency or institution of a State, having the same relationship to a Party as described in subparagraphs 6.2(f)(1) through 6.2(f)(3) above or otherwise engaged

in the implementation of Protected Space Operations as defined in subparagraph 6.2(e) above.

- 6.3 (a) Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in subparagraphs 6.3(a)(1) through 6.3(a)(4) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims, against:
- (1) the other Party;
 - (2) a Partner State;
 - (3) a related entity of any entity identified in subparagraphs 6.3(a)(1) or 6.3(a)(2) above;
 - (4) the employees of any entity identified in subparagraphs 6.3(a)(1) or 6.3(a)(2) above.
- (b) In addition, each Party shall, by contract or otherwise, extend the cross-waiver of liability as set forth in subparagraph 6.3(a) above to its related entities by requiring them to:
- (1) waive all claims against the entities or persons identified in subparagraphs 6.3(a)(1) through 6.3(a)(4) above; and
 - (2) require that their related entities waive all claims against the entities or persons identified in subparagraphs 6.3(a)(1) through 6.3(a)(4) above.
- (c) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the Convention on International Liability for Damage Caused by Space Objects of March 29, 1972,¹ where the person, entity, or property causing the damage is involved in Protected Space Operations, and the person, entity, or property dam-

¹ TIAS 7762; 24 UST 2389.

aged is damaged by virtue of its involvement in Protected Space Operations.

- (d) Notwithstanding the other provisions of this section, this cross-waiver of liability shall not be applicable to:
 - (1) claims between a Party and its own related entity or between its own related entities;
 - (2) claims made by a natural person, his/her estate, survivors, or subrogees (except where a subrogee is a Party) for bodily injury to, or other impairment of health of, or death of such natural person;
 - (3) claims for damage caused by willful misconduct;
 - (4) intellectual property claims;
 - (5) claims for damage resulting from a failure of a Party to extend the cross-waiver of liability to its related entities, pursuant to subparagraph 6.3(b) above.
- (e) Nothing in this section shall be construed to create the basis for a claim or suit where none would otherwise exist.

ARTICLE 7 -- Exchange of Technical Data and Goods

- 7.1 Except as otherwise provided in this Article, each Party will transfer all technical data and goods considered to be necessary (by both parties to any transfer) to fulfill its respective responsibilities under this MOU. Each Party undertakes to handle expeditiously any request for technical data or goods presented by the other Party for the purposes of this cooperation. This paragraph shall not require the Parties to transfer any technical data and goods in contravention of applicable national laws or regulations.
- 7.2 The Parties agree that the transfers of technical data and goods under this MOU will be subject to the restrictions set forth in this paragraph. Technical data and goods not covered by the restrictions set forth in this paragraph will be transferred without restrictions, except as otherwise restricted by applicable national laws and regulations.

- (a) The furnishing Party will mark with a notice, or otherwise specifically identify, the technical data or goods that are to be protected for export control purposes. Such notice or identification shall indicate any specific conditions regarding how such technical data or goods may be used by the receiving Party and its contractors and subcontractors, and by including (1) that such technical data or goods will be used only in the ISS program to fulfill responsibilities of the Parties or of a Cooperating Agency of the Space Station Partner, and (2) that such technical data or goods will not be used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purpose without the prior written permission of the furnishing Party.
 - (b) The furnishing Party will mark with a notice the technical data that are to be protected for proprietary rights purposes. Such notice will indicate any specific conditions regarding how such technical data or goods may be used by the receiving Party and its contractors and subcontractors, including (1) that such technical data will be used, duplicated, or disclosed only in the ISS program to fulfill responsibilities of the Parties or of a Cooperating Agency of the Space Station Partner, and (2) that such technical data or goods will not be used by persons or entities other than the receiving Party, its contractors or subcontractors, or for any other purpose without the prior written permission of the furnishing Party.
- 7.3 Each Party will take all necessary steps to ensure that technical data and goods received by it under subparagraphs 7.2(a) or 7.2(b) above will be treated by the Receiving Party, and other persons and entities (including contractors and subcontractors) to which the data and goods are subsequently transferred in accordance with the terms and conditions of the notice. Each Party will take all reasonably necessary steps, including ensuring appropriate contractual conditions in their contracts and subcontracts, to prevent unauthorized use, disclosure, or retransfer of, or unauthorized access to, such technical data and goods.
- 7.4 It is not the intent of the Parties to grant, through this agreement, any rights to a recipient beyond the right to use, disclose, or retransfer received technical data or goods consistent with conditions imposed under this Article.

- 7.5 For purposes of this cooperation, interface, integration, safety and testing data (excluding detailed design, manufacturing and processing data, and associated software) shall be exchanged by Parties without restrictions as to use or disclosure, except as specifically required by national laws and regulations relating to export controls.
- 7.6 Notwithstanding any other provisions of this MOU and if not agreed otherwise, each Party and its contractors and subcontractors shall make available to the other Party and the other Party's contractors and subcontractors, sufficient data to maintain and repair all deliverable items under this MOU. Such data may be marked in accordance with paragraph 7.2 and will be returned after the required maintenance or repair is completed.

ARTICLE 8 -- Intellectual Property

- 8.1. Except as provided hereafter, all Intellectual Property conceived or developed solely by either Party or either Party's contractors and subcontractors in the performance of this MOU shall be owned by such Party or by its contractors and subcontractors.
- 8.2. The Parties agree to give to each other the free right to have access to and use of any intellectual property developed under this MOU for the exclusive purpose of performing their respective obligations under this MOU without the right of reproduction, unless otherwise provided in this MOU or in other separate arrangements to be concluded by the Parties.
- 8.3. Any invention based on the data resulting from the testing, assembly, use and in-flight operation or the analysis related to any enhancement item referred to in Article 3, shall be the property of the Party whose intellectual effort has produced the data or has made a major contribution to this invention or, as the case may be, of that Party's contractors and subcontractors. NASA and ESA shall be entitled to a free of charge, non-exclusive, irrevocable license to use the invention produced by the other Party or the other Party's contractor or sub-contractor, for their own programs in the field of space research and technology and their space applications without the right to give sublicenses for purposes other than the above programs.
- 8.4. For the purpose of paragraphs 8.2 and 8.3 above, the Parties shall ensure that they or their contractors or subcontractors notify NASA and ESA of any application for a patent or other industrial property right within four months of the filing. NASA and ESA shall treat such information as con-

fidential as long as the application for the patent, or other form of industrial property right, has not been published in accordance with the relevant law or during a period of 18 months following this application.

- 8.5. Where there is any doubt as to the application of these clauses to a particular situation such as intellectual property generated jointly or intellectual property belonging to third parties, or where a further agreement is needed to implement them in a particular case, then the Parties shall take without any delay all reasonable steps to maintain maximum legal protection and confidentiality.

ARTICLE 9 - Public Information

NASA and ESA retain the right to release public information on their respective portions of the program. Each Party will coordinate, as appropriate, with the other in advance concerning its own or joint public information activities related to subjects covered by this MOU.

ARTICLE 10 -- Customs and Immigration

- 10.1 NASA will facilitate and expedite the movement of persons and goods necessary to implement this MOU into and out of the United States, subject to applicable national laws and regulations. ESA will facilitate and expedite the movement of persons and goods necessary to implement this MOU into and out of the territories of its Member States, subject to applicable national laws and regulations.

- 10.2 NASA will arrange for free customs clearance for entrance to, and exit from, the United States for goods necessary for implementation of the activities described herein. ESA will arrange for free customs clearance for entrance to, and exit from, its Member States for goods necessary for implementation of the activities described herein. Such arrangements shall be fully reciprocal. In the event that any customs duties, fees, or taxes of any kind are levied on the equipment or related goods necessary for implementation of this MOU, the Party of the State levying the duties, fees or taxes shall bear responsibility for payment.

ARTICLE 11 -- Financial Arrangements

- 11.1 Each Party will bear the costs of fulfilling its responsibilities, including but not limited to costs of compensation, travel, and subsistence of its own personnel and transportation of all equipment and other items for which it is

responsible under this MOU, except as provided for in other arrangements between the Parties.

11.2 The financial obligations of each Party pursuant to this MOU are subject to its funding procedures and the availability of appropriated funds.

11.3 In the event that funding problems arise that may affect a Party's ability to fulfill its responsibilities under this MOU, that Party will promptly notify and consult with the other Party.

ARTICLE 12 -- Consultations and Settlement of Disputes

12.1 The Parties may consult on any matter arising out of this MOU. Any issue concerning the interpretation or implementation of the terms of the MOU that cannot be resolved otherwise, will be referred to the appropriate level of authority of the Parties for consideration and action.

12.2 If an issue not resolved through consultations still needs to be resolved, the Parties, if they agree, may submit that issue to an agreed form of dispute resolution, such as conciliation, mediation, or arbitration.

ARTICLE 13 -- Amendment

This MOU may be amended by written agreement of the Parties. Each Party may propose to the other amendments to this MOU in writing. An amendment will enter into force as of the date of its signature by the Parties, after completion of their respective approval procedures, unless otherwise agreed.

ARTICLE 14 -- Standards and Language

14.1 Units for technical and scientific value will be in the metric system, except for interface data related to the Space Shuttle which will be in dual metric/English units.

14.2 Safety and mission assurance standards will be adhered to; each Party may use its own safety and mission assurance standards. However, those standards must meet or exceed Space Station standards. ESA must develop and implement detailed Space Station safety and mission assurance plans for the utilization enhancement items, and certify that those plans have been met with respect to the Space Station elements and payloads it provides. NASA has the overall responsibility to certify that the payloads are safe. Where Space Shuttle requirements are appropriate, these standards will be used by

both Parties. The applicable standards will be documented in the implementation plans.

- 14.3 The working language for all activities under this MOU will be the English language and all data and information generated and provided under this MOU will be in the English language. The foregoing principle does not preclude the use of another language when such use is accepted, in specific instances, as agreed by the Parties.

ARTICLE 15 -- Termination

- 15.1 NASA or ESA may terminate this MOU at any time by giving at least 12 months prior written notice to the other Party. Upon notice of termination for any reason, NASA and ESA will expeditiously negotiate a termination agreement, consistent with paragraph 15.3 below.
- 15.2 Termination by either Party will not affect that Party's continuing rights and obligations under this MOU with regard to liability and the protection of technical data and goods unless otherwise agreed in a termination agreement pursuant to paragraph 15.1.
- 15.3 Because ESA's contribution is essential to the utilization program of the International Space Station, upon its withdrawal, ESA shall ensure the effective use and operation by NASA of the ESA-provided utilization enhancement items. To this end, ESA shall take all necessary actions to enable NASA to succeed to all rights or title to, or interest in, all existing drawings, documentation, software, hardware, spares, tooling, and any other necessary items.

ARTICLE 16 -- Entry into Force and Duration

This MOU will enter into force upon signature, and will remain in force until the completion of activities under this MOU or for 10 years, whichever occurs first. It may be extended for such additional periods as may be mutually agreed.

ESA will provide NASA with translations of this MOU in the French and German languages.

Done at Washington, DC, and Paris, France, in two originals in the English language.

FOR THE UNITED STATES
NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION:

FOR THE EUROPEAN
SPACE AGENCY:

Daniel S. Goldin
Date: March 11, 1997

J.M. Luton
Date: March 18, 1997