

**MEMORANDUM OF UNDERSTANDING BETWEEN THE NATIONAL
AERONAUTICS AND SPACE ADMINISTRATION AND THE EUROPEAN
SPACE RESEARCH ORGANISATION FOR A COOPERATIVE PROGRAMME
CONCERNING DEVELOPMENT, PROCUREMENT AND USE OF A SPACE
LABORATORY IN CONJUNCTION WITH THE SPACE SHUTTLE SYSTEM**

Signed and proclaimed at Neuilly-sur-Seine
14 August 1973

Expired
1 January 1985

PREAMBLE

Pursuant to the offer of the Government of the United States of America to Europe to participate in the major US space programme which follows the Apollo programme, and in particular in the development of a new space transportation system (Space Shuttle), the execution of which has been entrusted by the Government of the United States of America to the National Aeronautics and Space Administration (NASA), European States, members of the European Space Research Organisation (ESRO), have manifested their desire to develop a Space Laboratory, hereinafter referred to as "SL", in the form of a Special Project within ESRO, for the purpose of participation in the Space Shuttle programme. These States, by means of an international Arrangement have charged ESRO or its successor organisation with the execution of the SL programme. In order to provide for appropriate association of the two Agencies in the execution of both programmes and in order to assure the necessary coordination between them, NASA, acting for and on behalf of the Government of the United States of America, and ESRO, acting for and on behalf of the Governments of those States participating in this Special Project, have drawn up this Memorandum of Understanding which sets out the particular terms and conditions under which such association and coordination will be effected. This Memorandum of Understanding will be subject to provisions of the Agreement between the Governments of the above participating States and the Government of the United States of America concerning this cooperative programme.

ARTICLE I OBJECTIVES

The purpose of this Memorandum of Understanding is to provide for the implementation of a cooperative programme in which ESRO undertakes to design, develop, manufacture and deliver the first flight unit of an SL, and other materials described in this Memorandum. This flight unit will be used as an element to be integrated with the Space Shuttle. This Memorandum sets out furthermore the provisions for ESRO access for use of the SL and for the procurement by NASA of additional SLs, and establishes the cooperative structure between NASA and ESRO for dealing with all questions concerning interface between the Shuttle and SL programmes and concerning the missions to be defined.

ARTICLE II GENERAL DESCRIPTION OF THE SL PROGRAMME, ITS INTERFACE WITH THE SPACE SHUTTLE, AND ITS USES

1. Summary description of the SL programme

The SL programme provides for the definition, design and development of mannable laboratory modules and unpressurised instrument platforms (pallets) suitable for accommodating instrumentation for conducting research and applications activities on Shuttle sortie missions. The SL module and SL pallet will be transported, either separately or together to and from orbit in the Shuttle payload bay and will be attached to and supported by the Shuttle orbiter throughout the mission. The module will be characterised by a pressurised environment (permitting the crew to work in shirt sleeves), a versatile capability for accommodating laboratory and observatory equipment at minimum cost to users, and rapid access for users. The pallet, supporting telescopes, antennae and other instruments and equipments requiring direct space exposure, will normally be attached to the module with its experiments remotely operated from the module, but can also be attached directly to the Shuttle orbiter and operated from the orbiter cabin or the ground. Both the module and the pallet will assure minimum interference with Shuttle orbiter ground turnaround operations.

2. Interface with Shuttle

The Shuttle will: serve in missions to deliver payloads to earth orbit; maintain station on orbit for mission durations in the order of seven days or more; provide safety monitoring

and control over payload elements throughout the missions; and provide seating and complete habitability for crews, including free movement between the SL module and the Shuttle. In the interest of minimising developmental and operational costs, and maximising reliability, an effort will be made to optimise commonality between SL and Shuttle components.

3. Use objectives

The SL will support a wide spectrum of missions for peaceful purposes and will accept readily the addition of special equipment for particular mission requirements. The SL will facilitate maximum user involvement and accessibility. The flight equipment complement will be capable of augmentation as appropriate to satisfy approved programme needs. It will be possible for users to utilise the SL with or without supplementary equipment for a single experiment or, in the alternative, to utilise only a small portion of the SL in combination with other experiments. The standard resources of the SL may be utilised to any degree appropriate by an experimenter adhering to standardised interfaces which are to be defined and procedures which are to be set forth. Considerable flexibility in equipment and mission structuring shall be available to the user for effective mission operation.

ARTICLE III PHASING AND SCHEDULING

1. Phase B studies

Based on present schedules, the Phase B (preliminary design) studies of the SL are expected to be completed around the end of 1973.

2. Phases C & D

At the completion of the Phase B studies, the parties will mutually agree on a design for immediate implementation and development by ESRO in Phases C & D (final design and hardware development and manufacture).

3. Completion schedules

It is currently planned that the first operational space flight of the Shuttle will occur in late 1979. To permit adequate time for experiment integration, check-out and

compatibility testing, the SL flight unit shall be delivered to NASA about one year before the first operational Shuttle flight.

4. Schedule changes

Each party will keep the other fully and currently informed of factors affecting the schedules of the Shuttle and the SL respectively and their potential effects on flight readiness.

ARTICLE IV PROGRAMME PLANS

The foregoing gross descriptions of the SL programme and of the phasing, scheduling and working arrangements are amplified in greater detail in the preliminary version, dated 30 July 1973, of the Joint Programme Plan. The parties recognise that many issues remain to be resolved in the Joint Programme Plan, which is to be developed and updated as appropriate by the Programme Heads. This plan is to be based on the results of preliminary design studies now in progress in both Europe and the United States, on the results of independent and joint studies of user requirements, and on the final definition of, and the requirements for integration with, the Shuttle.

ARTICLE V PERSPECTIVE RESPONSIBILITIES

1. ESRO responsibilities

Among ESRO's responsibilities are the following:

(a) design, develop and manufacture one SL flight unit (consisting of one set of module and pallet sections), one SL engineering model, two sets of SL ground support equipment, initial SL spares, along with relevant drawings and documentation; and qualify and test for acceptance this equipment according to NASA specifications and requirements;

(b) deliver to NASA the items listed above;

(c) design, develop and manufacture such elements as ESRO and NASA may agree to be necessary for the programme in addition to those listed in (a) above;

- (d) establish in the US and accommodate in Europe agreed liaison personnel;
- (e) provide all necessary technical interface information;
- (f) provide agreed progress and status information;
- (g) following delivery of the above flight unit, maintain and fund an SL sustaining engineering capability through the first two SL flight missions, and ensure for NASA's account the future availability to NASA of such engineering capability to meet NASA's operating requirements, on the same conditions as would apply to ESRO;
- (h) ensure the production in Europe and possibility of procurement by NASA of subsequent flight units, components and spares; and
- (i) provide for preliminary integration of experiments which ESRO supports, as well as acquire the corresponding data, within the overall responsibilities of NASA described in paragraph 2(j) of this Article, and process it.

2. NASA responsibilities

Among NASA's responsibilities are the following:

- (a) establish in Europe and accommodate in the US agreed liaison personnel;
- (b) provide general technical and managerial consultation;
- (c) provide all necessary technical interface information;
- (d) provide agreed progress and status information;
- (e) monitor ESRO technical progress in selected areas as defined in the Programme Plans;
- (f) review and concur in the implementation of ESRO activities critical to the NASA programmatic requirements for the SL as defined in the Programme Plans;

(g) specify, in order to assure successful operation of the SL in the Shuttle system, operational plans, and hardware and operational interfaces as defined in the Programme Plans;

(h) conduct systems analyses for development of operational concepts and utilisation plans, and assess the impact of changes at all SL external interfaces;

(i) develop selected peripheral components, not part of, but necessary to the successful operation of the SL (e.g. access tunnel, docking ports); and

(j) manage all operational activities subsequent to the delivery of the SL, including experiment integration, crew training, checkout, flight operations, refurbishment, data acquisition, preliminary processing and distribution of data.

3. By agreement of the NASA Administrator and the Director General of ESRO, changes may be made in the above responsibilities, as may be desirable for the implementation of this cooperative programme.

ARTICLE VI COORDINATION --LIAISON--REVIEW

1. Programme Heads

Each of the parties has designated in their respective Headquarters an SL Programme Head. They will be responsible for the implementation of this cooperative programme and they will meet and communicate as they require.

2. Project Managers

In addition, each of the parties will designate an SL Project Manager responsible for day-to-day coordination in the implementation of this cooperative programme.

3. Joint SL Working Group (JSLWG)

The two Programme Heads will together establish a Joint SL Working Group with appropriate technical representation from each party. The Programme Heads will be co-chairmen of the JSLWG. The JSLWG will be the principal mechanism for:

- (a) the exchange of information necessary to inform both parties fully of the status of both the Shuttle and the SL;
- (b) monitoring interface items, problems and solutions;
- (c) early identification of issues or problems of either party which may effect the other; and
- (d) assuring early action with respect to any problems or requirements.

4. Liaison

The parties shall each provide and accommodate liaison representation at levels as mutually agreed. The representation will be such as to assure each party adequate visibility of the other's progress especially with regard to interfaces and their control. ESRO shall have representation on appropriate Shuttle change control boards to assure adequate opportunity to present the views and interests of ESRO with respect to any change. The ESRO representatives on the boards will have a voice but will not vote. NASA will have similar representation on the comparable ESRO SL board. ESRO and NASA will enable and arrange for visits to their respective contractors as required.

5. Progress reviews

Each party shall schedule progress reviews of its work in the Shuttle and SL programmes and shall provide access to the other to such reviews. Annual reviews will be conducted by the NASA Administrator and the ESRO Director General.

ARTICLE VII FUNDING

1. Costs

NASA and ESRO will each bear the full costs of discharging their respective responsibilities arising from this cooperative programme, including travel and subsistence of their own personnel and transportation charges for all equipment for which they are responsible.

2. Availability of funds

The commitments by NASA and ESRO to carry out this cooperative programme are subject to their respective funding procedures.

3. Principle on pricing

Neither party will seek to recover government research and development costs incurred in the development of items procured from the other in connection with this cooperative programme.

ARTICLE VIII NASA PROCUREMENT OF SLs

1. Principle

Subsequent to the delivery by ESRO of the SL unit and other items referred to in Article V,1 (a), NASA agrees to procure from ESRO whatever additional items of this type it may require for programmatic reasons, provided that they are available to the agreed specifications and schedules and at reasonable prices to be agreed. NASA should give an initial procurement order of at least one SL at the latest two years before the delivery of the SL unit referred to above. Recognising the desirability of gaining operational experience with the first flight unit before ordering additional units, but that the price and availability of production units will be dependent on the maintenance of a continuing production capability, NASA will endeavour to provide significant lead time for any subsequent procurement order.

2. NASA abstention from SL development

NASA will refrain from separate and independent development of any SL substantially duplicating the design and capabilities of the first SL unless ESRO fails to produce such SLs, components and spares in accordance with agreed specifications and schedules and at reasonable prices to be agreed. For any NASA SL programme requirements which are not met by SLs developed under this cooperative programme, NASA will have the right to meet such requirements either by making the necessary modifications to the SLs developed under this cooperative programme, or by manufacturing or procuring another SL meeting such NASA requirements.

3. Notice of prospective requirements

NASA will endeavour to give ESRO advance notice of any prospective requirements for substantially modified or entirely new SLs so as to provide ESRO with an opportunity to make proposals which might meet such requirements.

ARTICLE IX CONTINGENCIES

1. Non-completion of first SL or failure to meet specifications

NASA's obligations with respect to the SL shall lapse and ESRO will turn over to NASA without charge and without delay all drawings, hardware and documentation relating to the SL if ESRO abandons the development of the SL for any reasons, or ESRO is otherwise unable to deliver the SL flight unit prior to the first operational Shuttle flight, or the completed SL does not meet agreed specifications and development schedules. The right of NASA to use the said drawings, hardware and documentation shall be limited to the completion and operation of the SL programme. ESRO shall ensure that it will be in a position to provide as hardware any proprietary item for which it does not hold transmissible rights of reproduction.

2. Non-availability of subsequent SLs

If SLs, components and spares required by NASA after the first flight unit 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, ESRO will arrange in advance on a contingency basis any necessary licensing arrangements.

3. Design changes

While it is understood that ESRO will be represented on the Shuttle change control boards, NASA reserves the right to require changes affecting the interfaces or operational interactions between the Shuttle and the SL after hearing and considering ESRO's views with respect to the prospective effect of such changes on the SL design or cost. NASA recognises the desirability of avoiding changes resulting in a disproportionate impact on the SL programme. To the extent that changes affect the Shuttle and SL programmes, NASA and ESRO will bear the increases in the costs of their respective Shuttle and SL development contracts.

ARTICLE X ACCESS TO TECHNOLOGY AND ASSISTANCE BY NASA

1. Principles

(a) ESRO will have access to technology, including know-how available to NASA and needed to accomplish successfully its tasks under this cooperative programme; for the same purposes, NASA will have access to technology, including know-how, available to ESRO. NASA will do its best to arrange for such technical assistance as ESRO and its contractors may require for the satisfactory completion of the SL programme. Access to technology and arrangements for technical assistance shall be consistent with applicable US laws and regulations.

(b) NASA will make available to ESRO general information related to the design, development, and use of the Shuttle and orbital system, particularly that required for the understanding of that system.

(c) Requests for use of technology, including know-how, in other than SL development and production tasks will be considered on a case-by-case basis.

(d) To the extent that NASA can make the required information readily available, it will do so without charge; in other cases, NASA will use its best efforts to facilitate its availability on favourable conditions.

(e) The access to technology, including know-how, referred to above will be effected in such a way as not to infringe any existing proprietary rights of any person or body in the United States or Europe.

2. Joint definition of areas

The two parties shall provide for the earliest possible joint definition of areas in which help in the procurement of hardware and technical assistance from US Government Agencies or nationals may be required.

3. Form of assistance

In providing such help to ESRO as may be agreed, NASA may respond on an in-house basis or may refer ESRO and/or its contractors to US contractors. NASA reserves the right to arrange for such assistance in the form of hardware, rather than know-how.

4. Quality control and acceptance

Where ESRO needs to procure US hardware, NASA agrees to use its good offices in connection with arranging the services of US quality control and acceptance and cost control and auditing personnel in US plants where available and appropriate.

5. Facilitation of export licenses

Early advance notification of contemplated ESRO procurements of US hardware or technology, including know-how, will facilitate assistance by NASA in connection with arrangements for export licenses consistent with applicable US laws and regulations.

6. Use of US facilities

Where it is jointly determined that it is appropriate and necessary for the conduct of the cooperative programme, NASA will use its good offices in connection with arranging for the use of US Government or contractors' facilities by ESRO and/or its contractors.

ARTICLE XI PRINCIPLES CONCERNING ACCESS TO AND USE OF SHUTTLE/SL

1. Planning

There shall be adequate European participation in NASA planning for Shuttle and SL user requirements, with a view to providing for inputs relevant to both the SL design and to European use of the SL. Appropriate representation and relevant procedures are being jointly prepared and will be subject to agreement by NASA and ESRO.

2. Flight crews

Flight crew opportunities will be provided in conjunction with flight projects sponsored by ESRO or by Governments participating in the SL programme and utilising the SL. It is contemplated that there will be a European member of the flight crew of the first SL flight.

3. Special provisions for the use of the first SL flight unit

(a) In order to assure the integrity of operation and management of the Shuttle system, NASA shall have full control over the first SL unit after its delivery, including the right to make final determination as to its use for peaceful purposes.

(b) With regard to the first flight of the first SL unit, the system test objectives will be the responsibility of NASA. The experimental objectives of this first flight will be jointly planned on a cooperative basis. Thereafter, the cooperative use of this first SL unit will be encouraged throughout its useful life although not to the exclusion of cost reimbursable use. NASA will otherwise have unrestricted use of the first SL unit free of cost.

(c) NASA may make any modifications to the first SL which it desires. Should NASA find it desirable to effect major modifications to this unit, these shall be discussed with ESRO which will be given the opportunity to provide modification kits. With respect to minor modifications, the normal procedures for configuration control will be relied on to provide adequate information on changes.

4. Subsequent availability and preferred access to participants

While it is premature to define the ultimate terms and conditions for operation and use of the Shuttle with the SL after the first SL mission, it is expected that the following principles will apply:

(a) NASA will make available the Shuttle for SL missions on either a cooperative (non-cost) or a cost-reimbursable basis. In the latter case, costs which may be charged include, but are not limited to, integration, check-out, crew training and data reduction, processing and distribution, as well as the costs of the launching services provided.

(b) In regard to space missions of ESRO and Governments participating in the SL programme, NASA shall provide access for use of SLs developed under this cooperative programme for experiments or applications proposed for reimbursable flight by ESRO and Governments participating in the SL programme, in preference to those of third countries considering, in recognition of ESRO's participation in this cooperative programme, that this will be equitable in the event of payload limitation or scheduling conflicts. Experiments or applications proposed for cooperative flight will be selected on the basis of merit in accordance with continuing NASA policy; such proposals of ESRO

and Governments participating in the SL programme will be given preference over the proposals of third countries provided their merit is at least equal to the merit of the proposals of third countries. ESRO and the Governments participating in the SL programme will have an opportunity to express their views with respect to the judgement of merit regarding their cooperative proposals.

ARTICLE XII PUBLIC INFORMATION

Each party is free to release public information regarding its own efforts in connection with this cooperative programme. However, it undertakes to coordinate in advance any public information activities which relate to the other party's responsibilities or performance.

ARTICLE XIII PATENTS AND PROPRIETARY INFORMATION

Each of the parties and their contractors shall retain unaffected all rights which they may have with respect to any patents and/or proprietary information, whether or not they antedate this Memorandum of Understanding. Where it is mutually determined that patentable or proprietary information should be transferred in the interest of successfully implementing this cooperative programme, this may be done under arrangements which fully recognise and protect the rights involved. In addition, each of the parties shall secure from its contractors the rights necessary to discharge the obligations contained in this Memorandum of Understanding in accordance with its internal rules.

ARTICLE XIV SETTLEMENT OF DISPUTES

1. Any disputes in the interpretation or implementation of the terms of this cooperative programme shall be referred to the NASA Administrator and the Director General of ESRO for settlement.
2. Should the NASA Administrator and the Director General of ESRO be unable to resolve such disputes, they may be submitted to such other form of resolution or arbitration as may be agreed.

ARTICLE XV
DURATION

This Memorandum of Understanding shall remain in force until 1 January 1985, but at least for five years from the date of the first flight of the SL. This Memorandum shall be extended for three years unless either NASA or ESRO gives notice of termination prior to 1 January 1985, or prior to the expiration of the five years, whichever is applicable. Thereafter, the Memorandum of Understanding shall be extended for such further periods as the parties may agree.

ARTICLE XVI
ENTRY INTO FORCE

This Memorandum of Understanding shall enter into force when both the NASA Administrator and the Director General of ESRO have signed it and it has been confirmed under the terms of the Agreement between the Governments of the participating European States and the Government of the United States of America concerning this cooperative programme.