

No. 26945

**UNITED STATES OF AMERICA
and
FEDERAL REPUBLIC OF GERMANY**

Memorandum of Understanding on the project of active magnetospheric particle tracer explorers. Signed at Washington on 15 October 1981

Authentic texts: English and German.

Registered by the United States of America on 29 November 1989.

**ÉTATS-UNIS D'AMÉRIQUE
et
RÉPUBLIQUE FÉDÉRALE D'ALLEMAGNE**

Mémorandum d'accord relatif au projet d'explorateurs traceurs de particules magnétosphériques actives. Signé à Washington le 15 octobre 1981

Textes authentiques : anglais et allemand.

Enregistré par les États-Unis d'Amérique le 29 novembre 1989.

MEMORANDUM OF UNDERSTANDING¹ BETWEEN UNITED STATES NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND THE FEDERAL MINISTER FOR RESEARCH AND TECHNOLOGY OF THE FEDERAL REPUBLIC OF GERMANY ON THE PROJECT OF ACTIVE MAGNETOSPHERIC PARTICLE TRACER EXPLORERS

The National Aeronautics and Space Administration (NASA) of the United States of America and the Federal Minister for Research and Technology (BMFT) of the Federal Republic of Germany as the Parties to this Memorandum of Understanding:

Recalling with satisfaction the considerable amount of cooperation already conducted between them in the area of space science;

Desiring to extend the fruitful cooperation developed in previous space projects;

Convinced that such cooperation will continue to produce benefits to both Parties:

Have agreed as follows:

Article 1

PURPOSE

NASA and BMFT each set forth in this Memorandum of Understanding their general understandings as to the general responsibilities of the Parties and the terms and conditions under which they have agreed to undertake a cooperative spacecraft project, the Active Magnetospheric Particle Tracer Explorers (hereinafter referred to as AMPTE), which utilizes two spacecraft to investigate sun-earth coupling by active experimentation.

Article 2

MISSION

The primary scientific objective of the mission is to study the entry of solar wind ions into the magnetosphere and the processes by which particles are energized in the magnetospheric tail. Tracer ions (lithium and barium) will be released and measured in the solar wind and within the distant magnetosphere. The AMPTE mission will also seek to obtain comprehensive measurements of the composition and dynamics of the natural charged particle populations within the Earth's magnetosphere. Furthermore, it is intended to study, by *in-situ* measurements and by remote optical observations, the interactions of released and ambient plasmas.

¹ Came into force on 15 October 1981 by signature, in accordance with article 16.

In addition, the mission will serve to establish values of physical parameters necessary for planning and execution of active experiments on Shuttle/Spacelab missions.

To carry out this project, NASA and BMFT plan to develop and launch two spacecraft. The Charge Composition Explorer (CCE) will be launched in 1984 on a Delta vehicle into a highly elliptical orbit with an apogee of eight Earth radii. The Ion Release Module (IRM) will be launched on the same vehicle with an additional kick stage to place it in a highly elliptical orbit with an apogee of about twenty Earth radii. Ion releases will be made by the IRM and ions will be detected by the CCE. Ground observations will supplement the spacecraft data.

Article 3

RESPONSIBILITIES OF NASA

To implement this cooperative project, NASA will use its best efforts to carry out the following responsibilities:

- (a) Design, fabricate, test, integrate and prepare for launching a complete CCE spacecraft, including its apogee kick stage.
- (b) Provide the CCE Medium Energy Particle Analyzer (MEPA).
- (c) Provide the CCE Hot Plasma Composition Experiment (HPCE).
- (d) Provide the collimator, time-of-flight section, and the high voltage power supplies for the CCE Charge Energy Mass Spectrometer (CHEM).
- (e) Provide specifications of the environmental conditions in the launch vehicle and the appropriate mechanical and electrical interfaces to the BMFT for use in preparing the IRM for launch.
- (f) Launch the CCE and the IRM on the same Delta launch vehicle.
- (g) Conduct tracking and telemetry operations for the CCE as defined in the NASA/BMFT AMPTE Project Plan (as defined in Article 5*d*) and the Support Instrumentation Requirements Document (SIRD).
- (h) Provide periodic tracking and telemetry support for the IRM as mutually agreed and defined in the NASA/BMFT AMPTE Project Plan and SIRD.
- (i) Process CCE science data, and provide these data to the Investigators in a form suitable for scientific analysis.
- (j) Arrange for procurement of the IRM perigee kick stage. The cost will be shared equally by NASA and BMFT. A Deposit Account at NASA will be used for this purpose.

Article 4

RESPONSIBILITIES OF BMFT

BMFT will use its best efforts to carry out the following responsibilities:

- (a) Design, fabricate, test, integrate and prepare for launching a complete IRM spacecraft, including the chemical release canisters and a magnetometer, and deliver it to the Kennedy Space Center.

(b) Provide additional diagnostic instrumentation on the IRM, provided the agreed primary mission objectives and the presently scheduled launch date are not impacted.

(c) Select, integrate and prepare for launching the IRM perigee kick stage.

(d) Provide analog electronics and data processing unit (DPU) for the CHEM instrument and support the participation of the Max Planck Institute for Aeronomy (MPAE) in the CHEM operations and analysis.

(e) Support the participation of the Max Planck Institute for Physics and Astrophysics in the part development of electron sensors of the HPCE.

(f) Support the participation of German personnel in Joint Working Group and review meetings, integration, launch, and operations activities and observation campaign in the U.S. and elsewhere.

(g) Conduct tracking and telemetry operations for the IRM as defined in the NASA/BMFT AMPTE Project Plan.

(h) Process and provide IRM orbital and science data to the Investigators in a form suitable for scientific analysis.

(i) Coordinate, in consultation with NASA, ground-based, airborne and other geophysical observations prior to and during the chemical releases.

(j) Support the procurement of the IRM perigee kick stage on a cost-shared basis as noted in Article 3, paragraph (j).

Article 5

MANAGEMENT

(a) The NASA will establish an AMPTE Project Office to provide for project planning and management. This office will be responsible for the overall design, fabrication, test, integration, in-orbit verification and operation of the CCE as well as the launch of both the CCE and the IRM spacecraft. The Project Office will be headed by an AMPTE Project Manager, designated by NASA. Responsibility for management of the AMPTE project resides with the AMPTE Project Manager.

(b) The NASA AMPTE Project Manager will be responsible for representing the AMPTE payload 'CCE and IRM' in all payload/Delta vehicle integration activities at the Kennedy Space Center.

(c) The BMFT will designate an AMPTE Project Manager, who will be responsible for the overall design, fabrication, test, integration, delivery, in-orbit verification and operation of the IRM.

(d) The two Project Managers will prepare and agree to a NASA/BMFT AMPTE Project Plan, which will then be approved by NASA and the BMFT. This Plan will contain detailed statements as to how this cooperative project is to be carried out, including mission planning, spacecraft and instrument description, interface requirements, number of models and hardware parts, necessary documentation and software, delivery schedules, planned testing, provisions for configuration control, data format compatibility and such other technical information as the Project Managers, or NASA and the BMFT, deem to be necessary for project control. The Project Plan may be amended by mutual agreement of the Project Managers. In