AMPTE/CCE

Active Magnetospheric Particle Traces Explorers/Charge Composition Explorer

Mission Objective

The multi-satellite Active Magnetospheric Particle Tracer Explorers (AMPTE) project is designed to assist in bridging the gap between the conclusions of passive survey-type missions and large-scale active experiments, by determining ranges of some of the physical parameters necessary for planning and executing experiments on future Shuttle/Spacelab missions. The AMPTE spacecraft include the Charge Coupled Explorer (CCE), the Ion Release Module (IRM) and the United Kingdom Satellite (UKS). AMPTE mission activities include the release by the IRM and the UKS, and monitoring by the CCE, of tracer ions (lithium and barium) in the solar wind and within the distant magnetosphere. The study will evaluate the access of solar wind ions to the magnetosphere, and the convective-diffusive transport and energization of magnetospheric particles.

TYPE OF MISSION	PROGRAM OFFICE	PROJECT LEAD CENTER	MANAGEMENT APPROACH	S/C CONTRACTOR	I&T CONTRACTOR
SPACE PHYSICS	SPACE SCIENCE	GSFC/FRG	OUT-OF-HOUSE	JHU/APL	JHU/APL

Payload Description

The AMPTE/CCE payload instrumentation is designed to detect lithium and barium tracer ions which will be transported into the magnetosphere in the CCE orbit after their release from one of the other two AMPTE spacecraft (e.g., the IRM and UKS). The instrumentation consists of four particle scientific instruments: Charge-Energy-Mass Spectrometer, Hot Plasma Composition Experiment, Medium Energy Particle Analyzer, and Plasma Wave Experiment; and a magnetometer. The AMPTE/CCE spacecraft is spin stabilized with its spin axis in the equatorial plane, offset from the earth-sun line by about 20 degrees. The electrical design includes redundant transponders, command systems, do/dc converters, and batteries. Telemetry, command, and data handling equipment also have selective redundancy in key areas, enabling functional redundancy to be established in space through reconfiguration via ground commands. Attitude control adjustments are performed with magnetic torqueing and cold gas thrusters.

INSTRUMENT NAME	ACRONYM	PI AFFILIATION	PRINCIPAL INVESTIGATOR	I&T CONTRACTOR
CHARGE-ENERGY-MASS SPECTROMETER	CHEM	UNIV MD	G. GLOECKLER	UNIV MD
HOT PLASMA COMPOSITION EXPERIMENT	HPCE	LPARL	E. G. SHELLEY	LPARL
MAGNETOMETER	MAG	APL	T. A.POTEMRA	APL/JHU
MEDIUM ENERGY PARTICLE ANALYZER	MEPA	APL	R. W. McENTIRE	APL/JHU
PLASMA WAVE EXPERIMENT	PWE	TRW	F. L. SCARF	TRW

Instrument Descriptions
The AMPTE/CCE Charge-Energy Mass Spectrometer (CHEM), Data Point 658, consists of an entrance collimator and an electrostatic analyzer section, followed by a time-of-flight and total-energy measurement. The instrument is developed and assembled by the University of Maryland to cover the gap in energy coverage between the upper end of realistic plasma instrument coverage and the lower end of multiparameter solid-state detector telescope coverage. The detector head and high voltage power supplies are provided by the University of Maryland. The rest of the electronics is developed and furnished by the Max-Planck Institute for Aeronomy (MPAE).
The AMPTE/CCE Hot Plasma Composition Experiment (HPCE), Data Point 660, consists of an entrance collimator and retarding potential analyzer, a curved-plate electrostatic energy analyzer, and a combined electrostatic-magnetic mass analyzer in series. All charge states and isotopes of hydrogen and helium and all major elements and charges up to and including iron are resolved. The instrument has some inheritance from similar instruments which fly on ISEE 1 and DE.
The AMPTE/CCE Magnetometer (MAG) is deigned to determine spacecraft attitude and provide magnetic field measurements for the determination of particle pitch angles, geospace boundaries, geomagnetic activity, and the study of magnetospheric current systems and plasma processes. The magnetometer consists of a triaxial fluxgate magnetometer system with the sensors mounted on a collapsible boom. The instrument is similar to those flown on Voyager, GIOTTO and Viking. The instrument includes seven automatically switchable ranges of measurement with command and control electronics, a band-pass filter, and an analog-to-digital converter.
The AMPTE/CCE Medium Energy Particle Analyzer (MEPA), Data Point 661, is developed at the Applied Physics Laboratory (APL) for GSFC. The instrument has the capability of reliably measuring very small fluxes of lithium tracer ions over a wide energy range in the presence of an intense background of protons, alpha particles and electrons while maintaining as large a geometry factor and as low an energy threshold as possible. In addition, the instrument has the capability of monitoring the natural tracer ions with exceptional charge, energy, pitch angle and temporal resolution. The instrument consists of a thin foil, solid state detector telescope with a very thin front element and a 10 centimeter separation between the front and rear detectors. Residual particle energy is measured in the rear detector.
The AMPTE/CCE Plasma Wave Experiment (PWE), Data Point 654, is designed and built by TRW to provide supporting electric field information for the mission. The instrument is small with a balanced electric dipole antenna of 70 cm and six bandpass channels to cover the energy range from 5 Hz to 178 KHz. It is similar to the Pioneer Venus Electric Field detector.

Launch
8/16/84