distribution and angle of arrival of solar wind protons. The Centre d'Etudes Nucleaires de Saclay is to measure electrons, protons and alpha particles of solar and galactic origin; and together with the University of Milan will look at the spectrum of cosmic ray electrons in the range 50–600 MeV.

HEOS-A also contains an experiment devised by the Max Planck Institute for Extraterrestrial Physics. This consists of a 2·5 kg capsule of barium to be ejected when the satellite is some 20,000 km from the Earth, crossing the boundary of the magnetosphere. The plan is to release the capsule at some suitable time, when the resulting cloud of barium ions can be photographed from Kitt Peak, Arizona, and from the site of the proposed European southern hemisphere observatory in Chile. The motion of the cloud yields information on the magnetic field at the ignition point.

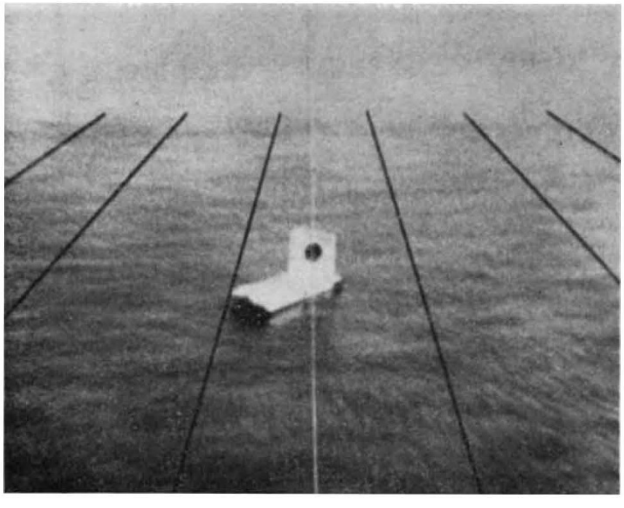
The experiments were tested on Monday this week when HEOS was just outside the magnetosphere. This first test seems to have caused some consternation at the ESRO control centre in Darmstadt, until it was realized that large readings in the Imperial College and the joint Italian–Belgian solar proton detectors did not represent a disastrously high noise level, but arose because the experiments had been fortuitously switched on in the midst of a solar event. Indications are that all the equipment is working well. The total cost of the project is $16 million, which includes the experiments and $3·6 million paid to the Americans for the launching operation.

DEFENCE

Missile by Television

THE completion of a successful series of firing trials of the Anglo-French Martel missile system has sparked off a substantial order for this novel weapon from the Ministry of Technology. The special feature of the British version of this air-to-ground strike missile is the television camera mounted in the nose cone, which sends back to the controlling aircraft a continuous transmission of the missile's forward view.

The missile part of the system has been designed and developed by Hawker Siddeley Dynamics in Britain and Engins Matra in France. Two versions of the weapon have been produced. The television version—for which Britain has the prime responsibility—is controlled from the launcher aircraft by a weapons controller who receives live transmission from the missile's camera. He is then in a position to steer the missile visually on to its target. The job is apparently sufficiently full-time as to eliminate using the pilot as the weapons operator. The picture below shows the view of a target as seen on the operator's television monitor, this particular target being moored at sea. The television guidance system has been developed by the Marconi Company, which claims that the technological barriers overcome in producing the compact electronics necessary to make the weapon operational have given the Anglo-French team a world lead in this field.



The picture shows the target as seen by the weapon operator on his television monitor screen.

The French version of the missile is designed to destroy enemy radar installations. It can operate against multiple targets, and achieves its end by homing directly on to the radar transmitters. Both the French and British versions are equipped with elaborate electronic counter-measure devices, essential to a system so susceptible to jamming.

Although the manufacturers are reluctant to give details of the missile's performance, it seems that the television version has destroyed targets ten feet in diameter from a distance quoted as "some tens of miles". The anti-radar model has had similar successes. The contracts already placed by the British Government seem to cost more than £10 million; Hawker Siddeley alone claims that it is benefiting to the tune of about £10 million, and Marconi claims that the orders are worth several million pounds to it. Both companies are confident of sizable export orders, particularly to NATO and Commonwealth countries.

NUCLEAR POWER

What Price Plutonium?

PLUTONIUM is not one of the metals the price of which is determined by the London Metal Exchange. Even that venerable institution, skilled as it is in determining the balance of supply and demand, might find it hard to keep up with the arguments which go to determine the price of plutonium. But four American utilities, Yankee Atomic, Consolidated Edison, Consumers Power and Commonwealth Edison, are sufficiently confident to have set up a joint association to fix export prices. Other utilities are likely to be invited to join the association, which will be safe from anti-trust action as long as the pricing agreements are intended only for export markets.

It would be fair to guess that the four utilities and any others that join the association will find it hard to agree on prices. Much will depend on the attitude taken towards the fast breeder reactor, for which plutonium provides the ideal fuel. It can also be used to fuel thermal reactors, and at the moment this seems to be the course that American utilities are adopting. But in Britain this attitude is seen as very much the second best, because of plutonium's characteristics. In any reactor, fissile plutonium has the advantage of emitting more neutrons per fission than does fissile uranium. Unfortunately, at the energies used in thermal reactors, plutonium also absorbs more, so it offers little, if any, advantage. In fast reactors, the