

money from the DTI has yet to be determined—according to Dr Maddock the money was awarded on the basis of agreement and the details are being worked out at present.

But was Hawker Siddeley awarded this money solely to develop research on linear motors? It seems not, for it became clear at the select committee meeting that the DTI was concerned at the beginning of the year that the demise of THL could jeopardise the combined THL and Hawker Siddeley bid to build a transport system in Toronto, Canada. So to a certain extent the money was awarded to maintain the credibility of the bid. Since then, of course the Toronto contract has been awarded to Krauss Maffei a German company.

But the contract with Hawker Siddeley is not exclusive and the DTI is at present discussing with GEC the possibilities of it doing some work on linear motors.

#### MARITIME SATELLITE

### GTS May Not Do

EUROPE is unlikely to be taking a share in Britain's Geostationary Technology Satellite. At a meeting of the European Space Research Organization's joint programmes and policy committee last week, a comparison between GTS and an adaptation of ESRO's own Orbital Test Satellite as possible maritime satellites was presented which heavily favoured the adoption of the ESRO satellite rather than GTS.

No decision has yet been taken in Europe to develop a maritime satellite to improve ship to shore radio contact, but ESRO has been undertaking studies for some time, and a performance specification for a maritime satellite has been drawn up, which has been largely approved by the Intergovernmental Maritime Consultative Organization (IMCO).

Britain offered GTS as a possible base for a test maritime satellite at last December's European Space Conference in Brussels at which the decision to attempt to rationalize Europe's space programme was taken. But ESRO's assessment of it argues that its facilities would not be adequate as a pre-operational satellite when compared to the facilities that ESRO's adapted Orbital Test Satellite could offer. GTS, being a completely new project, would also cost more, ESRO says.

GTS at present is still in the project definition stage. Conceived in mid-1971, its aim was to demonstrate high quality communications links and operative experience of various communications services, as well as to allow investigation of the propagation of radio frequency waves and of new British spacecraft systems.

The offer of it as a pre-operational

maritime satellite falls down chiefly because it is designed as an experimental technology satellite which will provide some operational experience, rather than as an operational satellite which also provides some experimental facilities, which is the concept behind the ESRO satellite.

It is not entirely surprising that ESRO's proposal meets the performance specification rather more closely than GTS. When the GTS proposal was submitted at the end of March the specification had not been drawn up, and ESRO's secretariat drafted the specification at the same time as the specification for ESRO's own proposal was worked out.

But given the performance specification that has emerged from ESRO's consultation with interested parties and with IMCO, GTS plainly fails to meet it.

The performance specification calls for a satellite with 17.5° "global coverage" antenna beams to service an area stretching from Panama to the Persian Gulf in order to cover the principal tanker routes and 50 per cent of the world's chief shipping movements. These antenna should provide satellite to ship and satellite to shore links. GTS, however, can only provide a 7° antenna beam designed to cover the North Atlantic in the satellite to ship band, and a 1° beam in the satellite to shore band—a beam that could only cover a small part of Europe. GTS also only provides eight channels, whereas the specification calls for sixteen, although GTS does provide experimental facilities to use time division multiple access (TDMA), which IMCO has urged should be studied, whereas ESRO's proposals can provide only frequency division multiple access (FDMA).

Nonetheless ESRO's proposal meets the MARSAT specification and GTS does not.

But whether the British proposal will in fact find favour when the choice between the two systems is raised at the ESRO council meeting planned for June 1, will depend on several factors. Partly it will depend on whether the council wants an experimental or an operational capability (and the latter seems more likely) and partly on the results of the inevitable bargaining that will take place on other European space ventures such as Spacelab, L3S, (the new launcher proposed by France) and the need to spread Europe's money as far as possible. One benefit from Europe's point of view in the British proposal is that Britain will shoulder 75% of the cost. If ESRO's version of a maritime satellite is built, Britain would not have to provide more than the Gross National Product share (23%) that she normally puts into ESRO programmes.

#### SOVIET SCIENCE

### Future Difficulties?

from our Soviet Correspondent

THE forthcoming meeting of the joint Soviet-United States team to discuss the Soyuz-Apollo project, which is scheduled for 1975, will take place under what are undoubtedly unfavourable conditions as far as the Soviet side is concerned. Although no official statements have appeared in the Soviet press two major setbacks occurred to the Soviet space programme last month.

Over the years, the Soviet space programme has had more than its fair share of failures. Some, such as the abortive launch on November 26, 1965, of a Venus probe, were "disguised" under the cover-all of the Kosmos programme. Failures on the launch-pad apparently go unreported, although reconnaissance satellites from the United States have observed four "disappearances" from the launch-pad of large rockets which have never gone into orbit. The most recent of these was at the end of November 1972. Even the failure last month of a major lunar probe, carrying what should have been Lunokhod-3, has passed without official comment. Only when loss of life is involved does Baikonur admit failure.

The failure of the Salyut-2 station, however, could not pass unremarked. A successor to the Salyut-1 of 1971, its launch was reported in *Pravda* on April 4 accompanied by an article on the Soyuz-Apollo project which pointed out that the docking fault which led to the deaths of the three cosmonauts who visited the Salyut-1 station had been overcome, and Salyut-2 would in due course be visited by a crew aboard a Soyuz. No such visit took place, however, and on April 12, the traditional Soviet "Cosmonauts' Day" (the anniversary of Gagarin's flight), it was announced that Salyut-2 was carrying out its assigned mission—the testing under remote control of on-board systems. Observers reported, however, that one of the solar panels of Salyut-2 had become detached, so that clearly the station was no longer in working order for a manned visit. Later TASS announced that Salyut-2 had "completed its mission" satisfactorily.

When the Soyuz-Apollo mission was first suggested it was considered that the chief problem would be to decide on whether to use air at reduced pressure or oxygen as the atmosphere. The language barrier was also considered to present difficulties (see *Nature*, 239, 362; 1972). According to Academician Petrov (*Pravda*, August 2, 1972) work on the mechanics of the link-up is already in progress. But doubtless the problems that Skylab has run into are occupying the Americans more at present.