

## Hubble Telescope taking shape

TECHNOLOGISTS from British Aerospace have just returned from California where they have been helping engineers from the European Space Agency's Technology Centre (ESTEC) to install the solar panels for the Hubble Space Telescope.

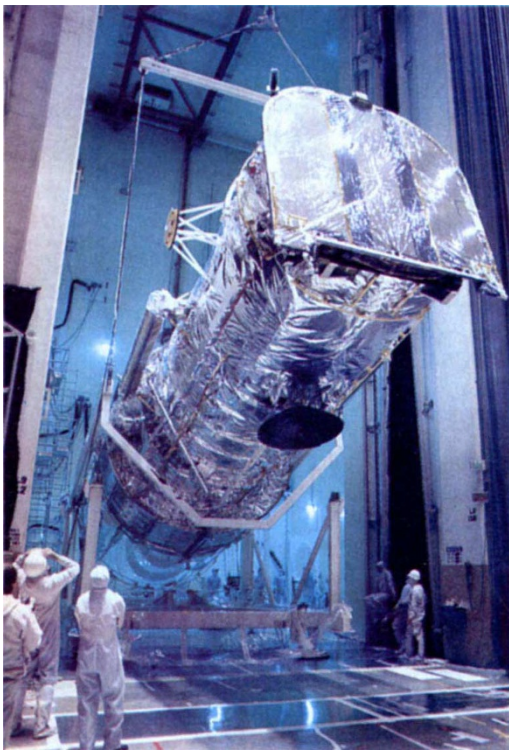
The arrays, built by a consortium led by British Aerospace, had been delivered in May to the telescope's construction site at the Lockheed Missile and Space Company complex in Sunnyvale. The arrays, the first to be designed to allow astronauts easily to retract and dismantle them, are contained on two panels unrolled from a single drum composed of more than 48,000 solar cells covering 356 square feet.

The retractability of the arrays and their ease of manipulation are two fundamental features of the design, as the telescope will have a 15-year life expectancy, three times that of the panels.

The telescope, due to be launched in two years time, will orbit at 593 km, allowing it to make observations free from Earth's atmosphere. It is designed to look seven times deeper into space, detect objects 50 times fainter and view them with 10 times greater clarity than the best telescopes on Earth. The Hubble Telescope will carry five scientific instruments that are replaceable and serviceable in orbit. They are the Faint Object Camera (FOC), the Faint Object Spectrograph, the High Resolution Spectrograph, the High Speed Photometer and the Wide Field/Planetary Camera.

Bill Johnstone

*Hubble on test at Sunnyvale*



## Coral reefs

# Okinawa runway under attack

Tokyo

THE battle to save one of the few thriving coral reefs left in Japan is about to reach its climax. The Okinawa prefectural government is expected soon to file a formal request with Japan's Construction Ministry to begin building an airport for jumbo jets on a reef of rare Pacific blue coral in Ishigaki Island, one of the southernmost islands of the Okinawa chain. Lined up to oppose the airport is an army of environmentalists from Japan and elsewhere.

The twin scourges of development and crown of thorns starfish (*Acanthaster planci*) have wreaked havoc with the coral reefs of the Okinawan Islands and the reefs of Ishigaki are rare remnants of what was once a thriving reef system.

Although Ishigaki already has an airport with a regular jet service to Okinawa, local government officials ten years ago proposed building a second airport with a longer 2.5-km runway to bring large jet-loads of tourists direct from Osaka and Tokyo, and in 1979 the site of Shiraho lagoon was selected.

Shiraho was selected because a nearby hill (Karadake peak) could be razed and dumped in the lagoon to create a level area of 130 hectares, conveniently walled in by the outer reef. But the people of Shiraho town (population 2,000) are vehemently opposed to the plan.

Two years ago, the Environment Agency planned a three-day survey of the reef. Local protesters tried to obstruct agency officials but were dissuaded by riot police and helicopters. Fearing further bad publicity, Ishigaki Town engaged Dr J. E. N. Vernon of the Australian Institute of Marine Science and Dr D. Kuhlmann of Humboldt University in Berlin to conduct a survey. But they were obstructed by Shohei Shirai, a local man appointed to help them, who later issued a report concluding that the reefs of north-west Ishigaki were the most valuable and the proposed site was not worth preserving. Vernon promptly disassociated himself from the report.

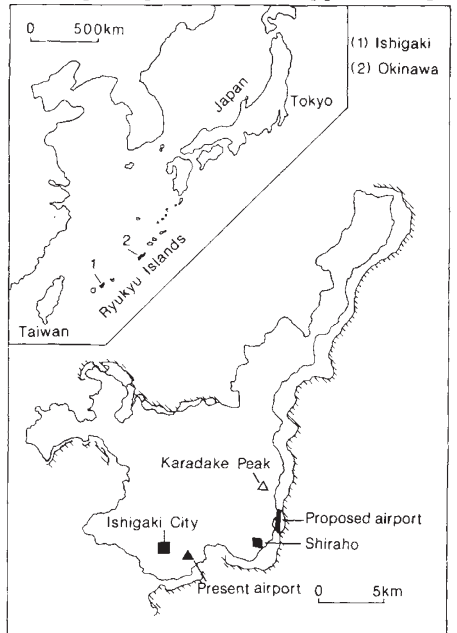
Vernon and other coral experts have been particularly struck by Shiraho's unusually extensive stands of Pacific blue coral (*Helipora cerulea*), a species listed under the Convention on International Trade in Endangered Species. Colonies tens of metres in diameter and 2-3 metres high stretch for hundreds of metres, constituting by far the biggest stands of this coral known in Japan.

In an attempt to allay concern, an informal advisory panel to the Governor of Okinawa that recommended construction of the airport has suggested that the coral be removed and 'replanted' elsewhere. But coral is not the only concern of oppo-

nents to the airport. Many have questioned the necessity of a second airport for such a small island, and there are fears that the 'spare' airport may be used for military purposes — Ishigaki is strategically placed at the southernmost tip of Japan.

Opposition to the airport is attracting worldwide attention. Last summer Jacques Cousteau wrote to the governor of Okinawa appealing for the plan to be dropped, and last month more than 500 environmentalists from Japan, the United States and the Philippines chartered a ship and called at Ishigaki to hold a protest rally on Shiraho beach.

In a ploy to delay construction, several hundred square metres of land needed for the airport apron that had slipped through



the government buyer's hands were promptly bought up by the anti-airport group and sold off in doormat-sized lots to supporters. The government will now have to negotiate with about a thousand 'owners' to get the land back.

But the biggest obstacle for the airport planners is the fishing industry of Shiraho. Fishermen in Japan wield extraordinary power, and their consent must be won before construction projects affecting fishing grounds can go ahead.

Although the 600-member fishermen's cooperative of Ishigaki accepted ¥500 million (£2 million) in 1980 as compensation for loss of fishing grounds at Shiraho, of which ¥200 million was earmarked to pay off the cooperative's debts, the 30 fishermen of Shiraho have steadfastly refused to accept the agreement, and have taken their cooperative to court. As long as the disbursement of compensation remains blocked, airport construction cannot go ahead.

David Swinbanks