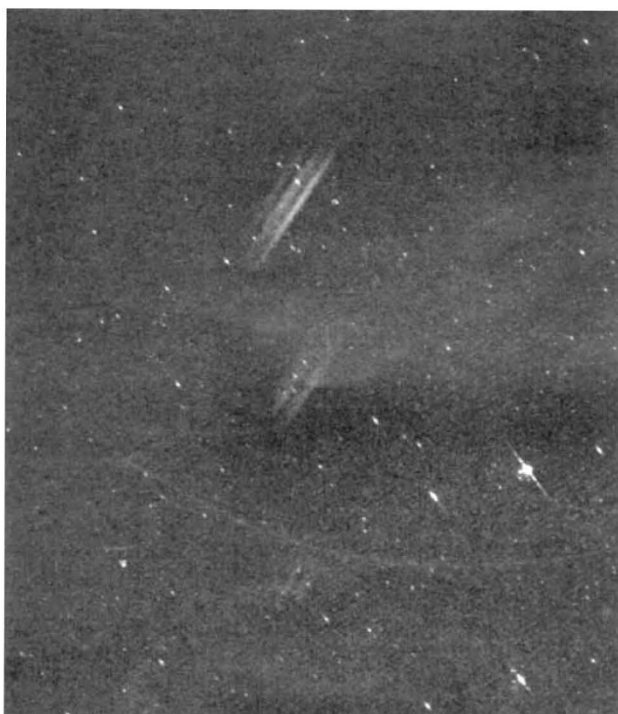


containing five of the eleven experiments scheduled for the cancelled TD 2 solar physics satellite. Called ESRO 4, the launch is due for the autumn of 1972. The chief contractors are Hawker Siddeley.

Six ventures are also under consideration as the major projects which justify Esro's existence as an organization to do what no European state can tackle on its own. It may be financially possible to choose two major projects this summer, so long as they are phased so that the peak expenditure comes at different times. A third may be chosen next year. The six candidate satellites are designed for (1) ultraviolet astronomy; (2) gamma ray astronomy using a spark chamber; (3) the Mercury probe; (4) studies of the magnetosphere with a geostationary satellite; (5) large-scale exploration of the ionosphere; and (6) studies of the upper atmosphere. The first four projects are



Three successive exposures of the barium cloud taken with a 48-inch Schmidt telescope at Mount Palomar Observatory, California. The cloud has formed striations along the line of force.

looked on more favourably than the less ambitious ionosphere and upper atmosphere satellites. The hope is that three out of the four will eventually be adopted. If the Mercury probe is picked this year, then the second project will presumably be correspondingly less ambitious. It seems clear, however, that the geostationary satellite, which for the first time will make it possible to disentangle time variations from space variations of magnetospheric phenomena, will fit in nicely with Esro's other activities. The plan is for the satellite to be on the same magnetic line of force as the Esro rocket range at Kiruna (Sweden), so that satellite measurements could be correlated with sounding rocket experiments and with observations by ground-based equipment also established at Kiruna.

Like almost every other organization, Esro is also going in for studies of applications satellites, but the organization is sensibly keeping off the rather dubious bandwagon of earth resources satellites, for the time being at least. Instead, it has its eye on applications where there are likely to be more financial benefits. This spring, Esro will place contracts for serious studies of weather satellites and communications satellites for air traffic control. The feeling is that Earth resources should come third in the list of priorities.

The sounding rocket programme which has been the backbone of the organization since its inception is to go on at more or less the same financial level as before. The trend is to increase the sophistication of the experiments, however, with more pointing rockets, for example, so that the number of launches will decrease.

The spectacular success of the barium cloud experiment last month is being taken in Esro circles almost as an omen that last year's nadir in the affairs of the organization is at last over. The aim of the experiment, planned by the Max Planck Institute for Extraterrestrial Physics, is to measure electric and magnetic fields high in the magnetosphere by observing the motion of a cloud of barium ions released from the HEOS satellite (*Nature*, **220**, 1171; 1968). Release took place over the Atlantic at a height of more than 70,000 km, and the cloud spread to a distance of 3,000 km. Photographic observing stations were at Kitt Peak in Arizona and at La Serena in Chile, and the cloud was visible by eye for as long as 22 minutes. It was also seen from as far away as Alaska.

#### MECHANICAL ENGINEERING

### Lubricating Tribology

TRIBOLOGY is the science of lubrication; it is also fashionable. According to the report of the Committee on Tribology for 1967-68 (HMSO, 5s 6d), the Ministry of Technology has now even produced a speaker's kit which includes briefing material, slides and films for the evangelists of tribology to use at "industrial gatherings".

Why is tribology so fashionable? The answer is that engineers and the ministry have suddenly discovered that it is cheaper to design suitable lubricants than to put up with a high rate of wear and tear and a high replacement rate. There is no mistaking the Ministry of Technology's determination to see that Britain is well provided with tribologists. The committee's report tells of the three new centres set up in the past year, at the Universities of Leeds and Swansea and at the Atomic Energy Authority's laboratories at Risley. These centres train people and also function on a commercial basis as part of a national network to offer consultancy services to industry.

The Leeds group has so far received contracts worth £10,000, including work on bearings for turbines and wear in machine tools. In one case, the centre has been able to suggest a change costing £50 a year which will mean a saving of several thousand pounds.

The report says that the atmosphere of commercial realism may account for the rapid rise in applicants for the MSc course which Leeds offers. In 1968, ninety people applied and eighteen were accepted compared with twelve, eight and five successful applicants in the previous three years. Risley has had equal success.

In its first nine months—in addition to work done for the Atomic Energy Authority—it has won industrial contracts worth over £22,000.

There are, of course, no surer signs that a subject has got off the ground than proliferation of journals devoted to it and arguments about its definition. In January 1968, *Tribology*, the first British journal devoted to the subject, began publication. A little later the first abstracting journal *Tribos* appeared. This year it is proposed to introduce an annual review of tribology and a *Tribology International Diary of Events*. Apparently academics are just as unsure about the boundaries of tribology as they are about the boundaries of molecular biology, and the ministry's advisory committee has therefore come up with the definition "the science and technology of interacting surfaces in relative motion and of related subjects and practices". That ought to be wide enough to include everyone who wants to be included.

## SHIPS

### More Scope for NERC

from a Special Correspondent

AFTER all the politicking (*Nature*, 218, 999; 1968), the Natural Environment Research Council's Research Vessel Unit has settled down well at Barry, Glamorgan. The unit's principal vessel, the 2,600 ton RRS *Discovery*, docked at Barry for the first time on March 28 on her return from a two month Mediterranean cruise—one could almost say "amidst scenes of public rejoicing". The event, which coincided with a beautiful sunny day, was made the occasion for an official welcome by the Mayor of Barry and senior members of the British Transport Docks Board (as well as NERC) and the tug that brought in the *Discovery* was dressed overall.

There is no doubt that Barry is delighted to have the unit, which will have much more scope there than at Millbay Docks, Plymouth—the unit's handling port for many years—where it had to hire berths ship by ship. At Barry, the unit has a 1,000 foot deep-water quay at No. 1 Dock and five acres of land which will provide space for extensive stores, workshops and offices for servicing equipment between cruises and rapid replenishment. Building has already started. No. 1 site is being let on a long lease, and though the negotiations are not complete it is expected that the terms will be easy. Barry Docks, built as an alternative coal port to Cardiff by the Rhondda coal tycoon David Davies in the 1880s and at one time with over thirty coal heads, is now under used with the decline of the coal industry. NERC's Research Vessel Unit will not be more profitable, but it may put Barry Docks back on the map.

The quay is long enough for four ships of the same size as the *Discovery* to tie up simultaneously and there are also moorings out in the basin. It seems likely that Barry may fairly soon be handling quite a research fleet for NERC. It is expected that the Antarctic expedition ships will in due course use Barry instead of Southampton. Another ship similar to the *Discovery* is in view for NERC though its specifications have yet to be settled, and there is already another vessel on order comparable with the *John Murray* (about 500 tons).

## MEDICAL STATISTICS

### More Mothers Survive

BETWEEN 1964 and 1966, twenty-six in every 100,000 pregnant women in England and Wales died as a result of their pregnancy. In the three years there was a total of 671 deaths directly as a result of pregnancy and a further 159 as a result of disease which occurred during pregnancy or childbirth. During the same period there were 2,630,150 births. Six out of every twenty-six deaths occurred during or after illegal abortions. Analysis of these crude figures, reported in *Report on Confidential Enquiries into Maternal Deaths in England and Wales, 1964-66* (HMSO, 10s 6d) further emphasizes the dangers of illegal abortion. More than a third of all deaths which resulted from avoidable factors were abortion cases.

In general, however, maternal survival has improved greatly since the early fifties, when between 65 and 71 of every 100,000 pregnant women died. And even the illegal abortionists improved their record over the same period from 13 out of 67 deaths per 100,000 in 1952, to 6 out of 26 deaths per 100,000 in 1966. The steadily improving survival rates for pregnant women are correlated with the steadily increasing proportion of births occurring in hospitals, which has risen from 65 per cent in 1961 to 75 per cent in 1966. The table shows the chief causes of deaths resulting from pregnancy.

	1955-57	1958-60	1961-63	1964-66
Abortion	141	135	139	133
Pulmonary embolism	157	132	129	91
Haemorrhage	138	130	92	68
Toxaemia	171	118	104	67
All other causes	254	227	228	220
Total	861	742	692	579

The survey shows that a woman is at least risk if she has her first child between the ages of 20 and 25 and if she completes her family before she is thirty. A fifth and subsequent pregnancy at any age is more risky, and a woman having her first pregnancy when she is forty or older requires, according to Sir George Godber, Chief Medical Officer, "very special care from doctors and midwives".

In the United States the maternal death rates are slightly higher than in Britain; the latest figure available is for 1967 when 28.9 in every 100,000 women died, but this average figure conceals a large difference between death rates among white and coloured women. Between 1963 and 1965 the death rate for white women of all ages was 22.4 per 100,000 while for coloured women the corresponding figure was 90.2. Three Scandinavian countries, Sweden, Denmark and Norway, have the lowest maternal death rates, 20, 20.6 and 21.7 per 100,000 respectively.

## MECHANICAL ENGINEERS

### Mergers in the Air

THE slow process of rationalization in the British engineering institutions will have moved forward a further notch this week—the chances are that the Institution of Locomotive Engineers will finally merge with the Institution of Mechanical Engineers. The mechanicals approved of the merger at an extraordinary