Britain Wields a Modernizing Ax

London. When Britain's Laborite ministers were seeking office last fall, their election appeals paralleled those made by Democrats in the United States before 1960. They spoke often of modernizing Britain, of getting it moving again.

In a simple view, modernization means feeding new money into neglected technologies, using the power of the government to launch great new projects that will stimulate the economy. An obvious example is President Kennedy's decision in 1961 to spend enough money for a good try at landing men on the moon before 1970. This was a big "yes" for American engineering. But since 1961 much expert effort in Washington has gone into saying "no"—for example, into scrapping a high-altitude supersonic bomber and forcing postponement of a decision on purchasing an antimissile system.

The views that politicians express while seeking power often change when they have arrived. When the Democrats took office it was found that the missile gap they had postulated did not exist. They found themselves canceling some missile projects even while they encouraged others. Modernization, in the face of requirements for technical sophistication, can be an ax as often as a prod.

After the Labor government took office, it seemed that a similar reversal would take place. Economic hailstorms broke. The modernizing ax was sharpened. Several ministries began reviewing military and civilian technology amid talk of abandoning "prestige" projects in favor of developing export industries. The whole future of the aviation industry seemed to be in doubt. Murmuring in the background were the sizable number of Laborites who favor unilateral renunciation of nuclear weapons.

Extreme views were current. Richard Worcester, an aviation consultant who has the ear of important Laborites, was reported to have suggested that 27 British aircraft types be dropped in favor of three American types: the F-111 (TFX) variable-sweep supersonic fighter, the C-141 jet transport, and the S-65 helicopter. A government white paper announced misgivings about the Concord supersonic airliner, being developed jointly with France, and Aviation Minister Roy Jenkins followed this up with a speech in the House of Commons, saying that, in the absence of any pressing social justification, the Concord should be made to pass strict economic tests (*Science*, 11 Dec. 1964).

It has not quite turned out as anticipated. The aviation industry has not been wiped out, nor has Britain abandoned nuclear weapons. Instead, these basic choices have been made.

1) The aviation industry can no longer think of developing aircraft solely for the British market; it must seek more cooperative projects with the United States and France, and it must resign itself to further contraction. Such a contraction would, of course, reduce the proportion of Britain's technical and economic resources committed to the aviation industry and release skilled workers for other industries sadly lacking them.

2) Far from renouncing nuclear weapons, Britain wants to join some form of American-European nuclear force and has proposed a new form for such a force. Pretense about an "independent" nuclear deterrent is to be dropped. It is acknowledged that, for reasons of cost or convenience, Britain will rely on the United States for essential components of her nuclear forces, such as Polaris missiles and essential parts of their warheads (Prime Minister Wilson made this plain in the House of Commons on 17 December. It was speculated that the warhead components were either tritium or a neutron-source "initiator" made of plutonium-241, or both). Of five Polaris submarines envisaged last year, only one will be canceled, it was announced 15 February. Britain cannot make large cuts in the forces stationed in Cyprus, Aden, Malaysia, and Germany, and a continuing commitment to countries around the Indian Ocean is foreseen.

It became clear early in December that construction of the Concord airliner must be allowed to go ahead because the political penalties of reneging on an iron-clad agreement with France seemed too great. There was no escape clause in the agreement, and France could take costly reprisal action if Britain failed to pay the large damage claims France was sure to make. With cancellation of the Concord, any chance of gradual entry into Europe through similar cooperation would end.

After some months of facing Britain's economic difficulties, the Labor government appears to be warming to the idea of closer ties to Europe, just as the opposition Conservatives have raised the issue as a banner in the campaign that might break at any moment. At first, the Concord was seen as an albatross, but then it began to look like a wedge into Europe.

Britain's Aviation Industry

The aviation industry is more important in Britain than in any other country outside the United States. It has for many years represented a major hope of technical advancement, making up for the backwardness or smallness of other British industries. It employs 260,000 workers and gets something like 25 percent of the government's research and development money. The industry can generate much political pressure, as the Labor government found out when an unwise remark by Denis Healey, the Minister of Defence, brought things to a head.

As the head of the major consumer of the airplanes being examined, Healey has been a central figure in Britain's current agonizing over technical choices. He has taken a strong cost-effectiveness line, and on 8 January he summoned reporters to an off-the-record briefing on his attitudes. He told them that the TSR-2 supersonic bomber would have to be can-

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celed, and he underlined this by saying: "It is not the duty of the ministry to wet-nurse overgrown and mentally-retarded children." This remark was soon traced to Healey, and it set off demonstrations by thousands of aviation workers. Rational consideration of technical options became more difficult.

Following the demonstrations and intense private lobbying by aircraft industry leaders, Prime Minister Wilson announced in a House of Commons speech on 2 February that the ax was being withheld from some major projects even though serious cuts were required, cuts which would save the government over $800 million in the next few years. A supersonic vertical-take-off fighter would be abandoned, Wilson said, but development of a subsonic VTO plane would continue. To help the RAF, which was losing the supersonic VTO fighter, Britain would purchase more Phantom F-4 jets from the United States. The Royal Navy had already decided to buy Phantoms. A planned short-take-off freighter would be abandoned, and American C-130's would be bought instead.

Cost was not the only factor behind the decision to buy American planes, Wilson noted. Neither the supersonic VTO fighter nor the short-take-off freighter would be ready in time to replace obsolescent planes.

Wilson acknowledged that the hardest decision of all is being postponed. This is whether to kill the TSR-2. Conceived as a strategic bomber like the French Mirage IV, the TSR-2 is planned to fly at supersonic speeds very close to the ground as it approaches its destined targets in western Russia.

To build a fleet of 150 TSR-2's would cost about $1.5 billion more than the $600 million already spent to develop and build prototypes and tool up for the first 50 planes. To buy 150 American F-111 fighter-bombers, which have many of the characteristics of the TSR-2, would cost something like $700 million less, Wilson estimated, adding that more information on F-111 costs would be needed. Furthermore, tests of the TSR-2's ability to withstand metal fatigue in very low flight are not complete, said Wilson, and tests of the "complete weapons system" have not even begun.

Nonetheless, there are reasons for delaying a choice. The manufacturer of the TSR-2 has plans for an improved version of the subsonic jet airliner, the VC-10, and is heavily involved in the Concord project: the Concord will use a version of the TSR-2's engine. Another cause of hesitation before taking so fundamental a step as canceling the TSR-2 is the fact that a committee has been set up to review the future of the whole aviation industry. Lord Plowden, a former chairman of the Atomic Energy Authority, heads the committee, which also includes Sir William Penney, the AEA's present chairman; Austen Albu, a Labor member of parliament who has been active in science policy matters; and Aubrey Jones, a maverick Conservative who was once the minister responsible for procuring aircraft.

Though it is waiting, the government is not happy. Even more bluntly than Wilson, Aviation Minister Jenkins summed up the government's attitude, on 9 February, in a Commons debate on aviation:

"No industry can live securely or healthily by forcing its products upon unwilling customers. This applies as much if the customer is the government . . . as if it were a whole series of private individuals. . . .

"Let us not have totally misplaced showmanship about aircraft procurement. Whatever decisions we have taken in the past weeks and may take in the next few months, we are at the end of the road as far as exclusive British manufacture of complicated weapons systems for an exclusive British market is concerned.

"We can afford to make products only if others buy them. The corollary is that we must be prepared to buy more of the products of others. Whether we like it or not, the all-British plane is out."

Disarmament and Defense

Although the Labor government has chosen not to abandon nuclear weapons, Labor Party politics require a strong effort toward further disarmament. The special minister in the Foreign Office charged with disarmament, Lord Chalfont (until recently Alun Gwynne-Jones, military correspondent of the *Times*), has pledged such an effort. Chalfont announced in the House of Lords on 17 December that he was establishing a panel of advisers and a research group modeled on the Arms Control and Disarmament Agency in Washington. He said that a recent visit to William C. Foster's agency had tremendously impressed him: "Nowhere in the world is such a wide and serious intellectual and scientific effort brought to bear on the problems of disarmament."

Chalfont explained how disarmament and defense are linked in the Labor government's mind: "No disarmament policy makes sense if its implementation places the safety of this country or its allies in peril. It is equally true and just as important that no defense policy can ever be acceptable if it makes disarmament more difficult."

The Labor government apparently is unhappy about the pace of disarmament talks since the test-ban treaty. In a by-election campaign address, on 2 February, Chalfont said that Britain must take the initiative to break an impasse between the United States and the Soviet Union. A plan must be sought "which will shake the two super-powers out of their entrenched positions and start everyone thinking once more of comprehensive disarmament not just as a subject for endless discussion by the side of a lake in Switzerland, not even just as a practical policy for the nations of the world, but as an urgent and imperative necessity if the arms race is not to end in disaster."

Chalfont has listed three main concerns.

1) Proliferation of weapons. Chalfont thinks that agreements can bind possessors of nuclear weapons not to transfer weapons or weapons secrets to other nations, and bind the nuclear have-not nations not to acquire weapons.

2) Extension of the test ban to cover underground explosions. Not much advantage is gained by such tests, Chalfont asserts. "We believe that techniques of detecting and identifying explosions have now been developed to a stage at which only a very small number of inspections would be needed."

3) An agreement to reduce the build-up of weapons and weapons-delivery systems. "It may be possible to link a freeze agreement with an agreement to destroy agreed numbers of weapons and delivery systems. Perhaps a start could be made with obsolescent bombers as the first step toward general and complete disarmament."

Although questions of defense have been salient in recent British techno-

logical policy debates, many other issues are also being faced.

The bill to divide scientific agencies between the new Ministry of Technology and the Department of Education and Science passed the House of Commons and was due to receive the approval of the House of Lords the third week in February. Its passage assured, officials of the many scientific agencies affected completed plans (in preparation since last summer) for the changeovers, which will take place formally on 1 April. The budget year will begin the same day. It appears that the redistributed scientific agencies will again receive handsome budget increases, as they have for the past several years.

New Policy for Science

Nonetheless, agency heads look forward with anxiety to the next few years. The government's finances look tight, and many observers wonder how long the pace of 15-percent annual increases for scientific agencies can be maintained. Pessimistic observers fail to be cheered by the fact that the old Advisory Council on Scientific Policy, when it assembled a "scientific shopping list" last summer in preparation for its final report, came up with no more than 15 percent per year as the likely growth rate for basic research between now and 1970, even though huge sums are to be spent for high-energy physics research in Britain and at CERN, the cooperative European center for such studies. They wonder if the British government will be able to support CERN's requests, though such support definitely has not been ruled out. And they point to the problem which is on many people's minds in Britain just now: the lack of applicants for the large number of new university spaces created for science students. On 18 February it was announced that, although the number of science and technology students admitted to universities and colleges of advanced technology in October 1964 (19,275) was 1375 higher than the number admitted the year before, it was about 2000 lower than the number anticipated. If these "deficits" of science students continue, there will be pressure to slow the expansion of universities and research budgets, or, conceivably, more pressure on the part of the government to steer students away from the humanities into technical and scientific fields. It is known that highly placed scientists in the Labor government are greatly interested in improving science instruction in the lower schools as one way of attacking the problem.

There is doubt, too, about the adequacy of the new policy-making machinery for science. Among the leaders in this are P. M. S. Blackett, deputy chairman of the Technology ministry's advisory council; Sir Harrie Massey, chairman of the advisory council in the Department of Education and Science and hitherto a leader in Britain's space research program; and Sir Solly Zuckerman, scientific adviser to the Prime Minister and to the Ministry of Defence. Observers ask whether informal coordination among these men will be adequate for making the type of priority choices that will be required if money gets short. The new organization of the Department of Education and Science contains four research councils—for medicine, science, natural environments, and agriculture—and the science council supervises high-energy physics. What will happen, it is asked, when these councils really begin to compete for funds? Priorities are on the minds of many scientific leaders. Lord Florey, president of the Royal Society, replying on 18 February to a speech made before the Society by Mstislav Keldysh, president of the Soviet Academy of Sciences, noted that Keldysh had brought up the problem of priorities. Florey answered: "We hear the word 'priorities' very much in this country, too, just now."

The pressures created by the making of so many scientific and technological choices have been great. They were somewhat increased when on 21 January Foreign Secretary Patrick Gordon-Walker's defeat in a by-election caused him to resign and Technology Minister Frank Cousins won his by-election with a reduced majority. To take Gordon-Walker's place, Michael Stewart, a major figure in the Labor Party, moved up from the Department of Education and Science. Into Stewart's old job came Anthony Crosland, Economic Secretary to the Treasury. Austen Albu, expected by many to get one of the scientific posts last October, went instead to Crosland's place at the Treasury.

Cousins, in his first speech in the House of Commons on 18 February, discussed plans to increase the limit of government loans to the invention-exploiting National Research Development Corporation from $28 million to $70 million, and to remove the old 20-year limit on such loans. Cousins also announced that the corporation's director will get a seat on the Atomic Energy Authority to improve links between the AEA and industries outside the area of atomic power. The AEA was transferred to the Technology ministry last October. When the new budget year starts 1 April, the authority's commercial activities (selling fuel elements, isotopes, and electric power from its reactors) will be moved into a separate corporation. This corporation is expected to sell about $80 million worth of products a year, and its target is a $10-million annual profit at the end of 5 years.

Along with the welter of decisions about science and technology, there has been a welter of talk. Concern about technology's relatively weak position in Britain seems to have spread outside the government. An example is the Royal Society's decision to increase the number of members elected each year from 25 to 32 to make more room for technologists. Florey announced the step on 30 November. He himself was made a peer at the turn of the year as part of the Labor government's plan to honor scientists and technologists.

The government seems determined to use scientists and engineers in policy-making positions not directly connected with research. Lord Hinton, another recently named peer, has been appointed to make a major survey of all Britain's transportation industries. A veteran of atomic-weapon and atomic-power development, Hinton later was chairman of the Central Electricity Generating Board, where, paradoxically, he helped to force consideration of American reactors for the next 5-year program of nuclear-power-station construction in Britain. Hinton was named after complex maneuvering had ruled out Richard Beeching, who has headed British Railways for several years. Beeching will shortly return to Imperial Chemical Industries.

Although it is not certain that the Labor government's program will mean great new expenditures on science and technology, it is clear that scientists and engineers will have a major voice in the choices to be made.

—VICTOR K. MCELHENY