Nuclear Weapons, Systems and Forces

Ever since the Nassau agreement between Britain and the U.S.A., the "state of play" on nuclear armaments has become increasingly difficult to follow, whilst the growth of a special language using expressions such as "multi-national", "multi-lateral", "overkill", and so on further obscures the facts. The purpose of this article is not to argue one policy against another, but to outline some of the factors involved in the selection of one or other system of deterrence.

PERHAPS THE FIRST rather obvious point to be made is that a nuclear weapons system comprises two essentials: the weapon, and the means of delivery. There is almost as great a variety of weapons as means of delivery.

Most systems are capable of delivering either nuclear or high-explosive weapons, or in some cases scientific instruments or an astronaut. Thus it is almost impossible to say of one particular system that it can be employed only for nuclear attack, or of another that it is capable only of scientific use. For example, fears have already been expressed that missiles like those used to launch space vehicles and astronauts might also be used to put a bomb into orbit; and, to take a more mundane case, the Tu-16 bombers supplied by the U.S.S.R. to Indonesia carry a missile which, so far as is known, is capable of use either with high explosive or nuclear warheads.

Should the U.S.S.R. decide to supply such weapons under the same sort of arrangement as that by which nuclear weapons can be made available for some N.A.T.O. aircraft, there would be an entirely new situation in South-East Asia. Since the Tu-16 has the range to penetrate deeply into Australia from Indonesian bases, it is easy to understand Australian anxiety aroused, not by the presence of nuclear weapons at this stage, but by the existence close at hand of a weapons system capable of delivering them. For somewhat similar reasons the state of distrust between Israel and Egypt is more than ever aggravated; and the supply and withdrawal of Soviet rocket weapons from Cuba is too recent history to need to be reminded of it.

Many can deliver

The important conclusion to be drawn from this is that, although only four nations so far are known to be capable of manufacturing nuclear weapons, there are many more who either possess already, or who might possess, means of delivery that would be effective in the theatre in which they exist, and which in consequence could become a threat to their neighbours.

The important qualification here is "in the theatre in which they exist", because the effectiveness of a delivery system obviously depends upon its ability to penetrate the defences concerned. The kind of system now in the hands of Indonesia would hardly be a serious threat against North America, where a comprehensive continental early-warning system alerts an air defence organisation that includes anti-aircraft missiles which are themselves nuclear armed. In the language of the business, the threat which would be perfectly "credible" in South-East Asia would not be "credible" if made against North America or the U.S.S.R.

In this there is nothing new. The threat of various sanctions short of war, or of war itself, has been since the beginning of recorded history the means by which one group of people or particular nations have sought to impose their will on another. Whether the threat has been effective or not has usually depended upon whether the side under pressure believed it, or preferred a trial of strength.

No survival

What is new is that now, for the first time in history, a weapon exists whose effects can be so immediately and utterly devastating that no nation on earth could expect to survive a successful onslaught. Nobody doubts the power of these weapons; it is the ability to deliver them that has become decisive.

Thus a threat depending upon free-falling bombs delivered by subsonic aircraft is already ceasing to be "credible" against the kind of defences now becoming operational in North America; but there is so far no defence in any country against missiles arriving at speeds of 6,000 m.p.h. or more. Defence against the latter kind of attack can therefore depend only upon the threat of retaliation. This, which is the second important point, is what is meant by the policy of "deterrence".

Furthermore, since in no circumstances is it conceivable that the West would be the aggressor who struck first, it follows that power to hit back effectively must be able to survive any initial onslaught. Hitting back would be the second blow, and this is what is meant by the often-used expression "second-strike capability".

Despite their other merits, the unprotected Thor bases in England lack this "second-strike capability" in today's conditions, and this is the reason why they are being dismantled, and why all missile installations now being commissioned by the U.S.A.F. will be protected in underground silos. It is upon these two factors —ability to deliver the weapon and second-strike capability—that the "credibility" of any deterrent chiefly depends.

Delivery systems

Nuclear deterrent delivery systems fall broadly into three categories. First, the immediate development of the World War II kind of bombing, in which the free-falling bomb is dropped from an aircraft. Second its development, in which the bomb is given wings, and is itself capable of powered and controlled flight to the target. The third category is that in which the weapon is delivered by a ballistic missile, which may be launched from a platform on earth, at sea, or in the air.

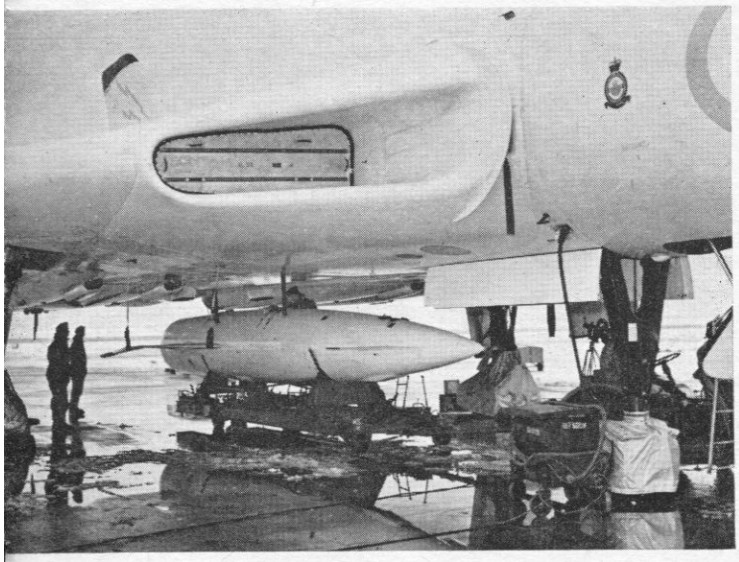
The first category includes almost any aircraft that can be fitted to carry and drop a medium-sized bomb, and in consequence now includes fighter/attack aircraft such as the Lockheed F-104G, the Mirage III and the North American F-100, as well as larger types of Victor and Vulcan size and heavy bombers like the U.S.A.F.'s B-52.

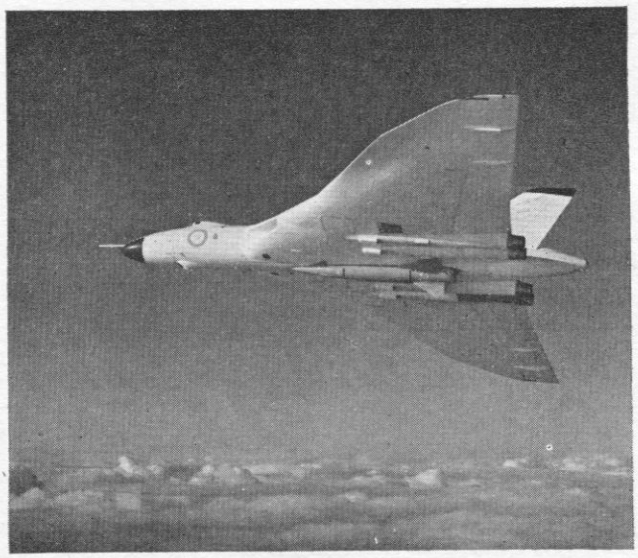
R.A.F. Bomber Command is now in the process of re-equipping with Blue Steel its Vulcans and Victors which were formerly armed with free-falling bombs. Blue Steel is a winged missile, carrying a warhead in the megaton range, and powered by a Bristol Siddeley Stentor rocket motor. It can fly at several times the speed of sound and at great height; its range is sufficient to permit the attack to be launched without the need for the parent aircraft to enter the target area.

Prior to the Nassau agreement it had been intended to supplement the later versions of Blue Steel with Skybolt. This would have been a pure ballistic missile, of performance similar to Polaris, but launched from a parent aircraft instead of from a submarine. Its speed would have been of the order of Mach 9, and its range sufficient to permit it to be launched at distances of up to 1,000 miles from its target. As is well known, this development will not now take place, and in place of it the British deterrent will be based upon Polaris.

French nuclear power

France is at the beginning of her experience as a nuclear power. Initially, she intends to rely upon a force of fifty Mirage IV bombers, armed with free-falling bombs. This aircraft can be refuelled in the air, and is capable of a speed of the order of Mach 1.8. The French system is in contrast to Bomber Command, whose V-bombers although themselves subsonic are being armed with a missile capable of several times the speed of sound. Subsequent developments in France envisage the use of powered controlled air-launched missiles, although whether winged or ballistic is not clear. Future development of the Mirage IV system will provide an interesting comparison with the technically much more advanced B.A.C. TSR-2.





First R.A.F. bomber unit to be armed with Blue Steel was No. 617 Squadron, Scampton, flying Vulcan B.2s (illustrated here). Two more Vulcan squadrons, Nos. 27 and 83, have since received Blue Steel

France also intends to equip both the Mirage III of the Air Force and the Etendard IV of the *Aéronavale* to be able to deliver nuclear weapons, so that during the period after 1965, France will have become a formidably armed nation. Future plans certainly include ballistic missiles, although whether these will be launched from land, sea, or air, or some combination of these is not known. Like Britain, France may consider the construction of armoured land-based missile complexes unsuitable for her needs, and in consequence go for air or sea launching.

U.S.A.'s weapons

The United States, with a far greater land area, has favoured a large number of land-based fixed launching sites, although not to the exclusion of other systems. First United States nuclear weapons were free-falling bombs, launched from subsonic aircraft. These weapons are now giving way to the Hound-Dog, which is an air-launched winged bomb, powered by a Pratt & Whitney J-52 jet engine. It is comparable to the earlier versions of Blue Steel, and is carried by the Boeing B-52G.

The ballistic replacement for Hound-Dog would have been Skybolt, but the U.S.A.F. will not now receive this weapon, and the U.S.A. is concentrating its energies increasingly upon land- and sea-launched ballistic missiles. The missile armoury comprises four main types: Atlas, Minuteman, Titan, and Polaris. The first three are the responsibility of the U.S.A.F. Strategic Air Command, the last of the U.S. Navy. Ultimately there will be a force of 141 Atlas missiles, of which 81 will be in armoured silos below ground and will be of the Atlas F type with a range of 10,000 nautical miles.

The Minuteman, with a range of 5,500 miles, differs from Atlas and Titan in having a solid fuel motor not unlike that used in Polaris. There will be 750 Minutemen all housed in underground silos. There are two types of Titan, Mark 1 with an 8,000-mile range, and Mark 2 whose range is extended to 12,000 nautical miles. Total complement of both Marks is to be 140 missiles. Again all these will be housed in underground silos.

The U.S. Navy has on order or delivered forty-one Polaris submarines, and expects to order six more this year. Polaris, which is a much smaller weapon than its land-based counterparts, is believed to carry a nuclear warhead of about half a megaton, as compared to the weapons of three megatons or more in the land-based missiles. Range of the first Polaris was a little over 1,000 nautical miles, with the expectation that this would be increased to 1,500 in later versions.

With the completion of the 47th submarine the U.S. Navy will muster a total of 752 Polaris missiles, so that the total United States force now planned is over 1,000 such weapons. This is of course additional to the numerous ship-borne and land-based aircraft not in Strategic Air Command which are also capable of nuclear attack. Many of these are European-based, either as part of the Seventh Fleet in the Mediterranean, or of the N.A.T.O. Tactical Air Forces.

Force organisation

Apart from the national forces already described, there is now in being the N.A.T.O. nuclear force. This force really came into effective existence as the result of decisions taken at the Ottawa meeting in May 1963. The most important decisions were to assign to the Supreme Allied Commander (SACEUR) the whole of the United Kingdom V-bomber force, and three U.S. Navy Polaris submarines.

These newly assigned forces are not all gain, as they may to some extent be regarded as replacing the U.S.A.F. B-47 units, now being withdrawn from service, upon which SACEUR would have been able to call. They do, however, constitute what may be regarded as the long-range element of the nuclear force, whose shorter-range components include CF-104 aircraft of the R.C.A.F. in Europe and F-100 units of both the U.S.A.F. and French Air Forces assigned to N.A.T.O.

It is worth noting that, with the exception of the Polaris submarines, the whole of the N.A.T.O. nuclear force is equally able to deliver high-explosive weapons, and has a mobility and versatility which the submarines lack. They can therefore operate in a wide variety of roles to suit almost any N.A.T.O. need. In its nuclear role, this force is what has become known as "the multi-national nuclear" force.

"Multi-lateral" force

The "multi-lateral" nuclear force is a completely different conception, canvassed at Ottawa, and still the subject of discussion. It is believed that the force would comprise 400 Polaris missiles, under United States control, mounted in a fleet of twenty-five merchant-type ships dispersed at sea. The ships would be manned by crews drawn from every N.A.T.O. country with nationalities mingled in every ship. One aim is apparently to give to non-nuclear powers—including Germany, who is forbidden by the Peace treaty either to possess or to manufacture nuclear armaments—an effective say in the management of the N.A.T.O. nuclear force.

The scheme has not been universally welcomed and has been unkindly dubbed "The Babel-ship plan". One particular criticism deserves mention since it illustrates the rather obscure expression "overkill". It is argued that if the deterrent forces of the West as now planned are sufficient for their purpose, the babel-ship force will be superfluous. In the peculiar language of the subject, it is said to represent "overkill capacity"—a simpler word for the same thing is "waste".

In this summary no mention has been

(continued at foot of next page)

Central Organisation for Defence

IN JULY THE Minister of Defence presented to Parliament a White Paper describing the new centralised defence system. It will be debated after the summer holidays and if it becomes law will come into effect from 1st April 1964. The paper is concerned almost entirely with reorganisation in Whitehall, and in its introduction specifically states that "The Services must preserve their separate identities . . . all experience shows that the fighting spirit of the individual man in battle derives largely from his loyalty to his ship, his unit, or his squadron."

This may be putting the chicken before the egg, and so far as the R.A.F. is concerned, more cogent reasons for its separate identity are contained in the leading article of this issue. The decision, however, is right.

In Whitehall the changes at first sight appear to be drastic; the Board of Admiralty, the Army Council, and the Air Council are abolished. Their places are taken by a single Defence Council, whose Chairman is the Secretary of State for Defence. In consequence the offices of the First Lord of the Admiralty, and the Secretaries of State for War and Air also disappear, but in their places will be substituted three Ministers of State for Defence designated Royal Navy, Army and Royal Air Force respectively. In addition to their places in the new Defence Council, these three Ministers of State will be Vice-Chairmen (the Secretary of State is Chairman in each case) of so-called "Boards of Management" for each of the three Services.

In effect, the Boards of Management replace the Board of Admiralty and the Army and Air Councils, and will be known as the "Air Force Board of the Defence Council" and so on. These three Boards will administer the respective services for which they are responsible under the policy direction of the Defence Council, and it is not easy to see how the necessary expansion of staff under the immediate control of the new Defence Council can be balanced by a corresponding reduction of staff under the three Boards of Management.

Notable omission

One notable omission in the new organisation described in the White Paper is the Fifth Sea Lord, hitherto responsible for Fleet Air Arm affairs in the Board of Admiralty; so clearly some new arrangement for the control of Naval Aviation will be introduced. It will be interesting to see if the institution of an Army Board of the Defence Council brings about any corresponding change in the direction of Land/Air Warfare, for the White Paper, despite its announcement of unification at the top, gives no indication of any impending unification of the three elements into which Britain's flying services remain divided.

The Ministry of Aviation remains a separate entity. The White Paper says: "The Ministry of Aviation has wide responsibilities for civil as well as military research and development. These are indivisible. . . . These responsibilities would, if transferred to the new Ministry of Defence, place upon it, and particularly on the Secretary of State, a very heavy additional load, much of it outside the Defence sphere."

Curious anomaly

A curious anomaly seems to be the transfer, or perhaps inheritance is a better word, of the Meterological Office from the Air Ministry to the new Ministry of Defence; if any change were necessary, surely the Ministry of Aviation would have been preferable.

Clearly an upheaval in Whitehall of the size contemplated will raise a lot of dust and commotion, and nobody could expect all problems to be solved, and the new arrangements to work smoothly when the whistle blows on 1st April 1964. Not least among the changes is the physical redistribution of offices in Whitehall Gardens, whence the Board of Trade will depart to make room for the new Ministry, and the consequent reshuffling that will take place in the Admiralty and the War Office.

One's principal sympathies are with the men and women responsible for the movement of tons of secret files.—G. J. C. P.

Nuclear weapons . . .

(continued from previous page)

made of the capabilities of the Communist bloc, for, although Russian achievements in the exploration of space are the object of world-wide admiration, and although the immense power of their nuclear explosions in the Arctic is now recognised, little of the information of the kind needed here is available.

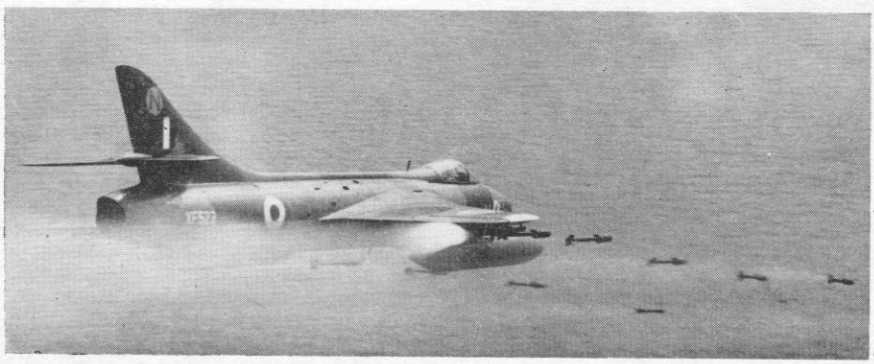
Mr. Krushchev was reported to have declared recently that the manned bomber is no longer of any military significance. If he really meant this, it becomes difficult to explain Russian energy in equipping nearly every possible bomber of significance in their vast air force with missiles of various kinds, many of which are clearly suitable for delivery of nuclear warheads. In fact all indications are that developments in the Soviet Air Forces run closely parallel with those of the West.

In the array of Western nuclear armaments, only President de Gaulle's *Force de Frappe* seems neither to be committed to N.A.T.O. nor to fit into any clear pattern. So far it consists only of five aircraft, still at the testing stage, and only embryo weapons. Yet it cannot be denied, especially when compared with the immense forces at the command of the U.S.A. and Russia, that French nascent nuclear power has already exerted an influence in world affairs out of all proportion to its actual size.

This example illustrates better than any other the effect of even the smallest nuclear capability compared with that of the older weapons. In an age of scientific achievement it confers a status previously attainable only by nations able and willing to muster masses of men into huge armies.

It is thus the inevitable weakness of all proposals for nuclear disarmament, unaccompanied by plans for a simultaneous reduction of other kinds of arms as well, that they imply reversion to dependence upon the older kinds of weapons served by large armies, perhaps raised by conscription, which are forever associated with the carnage of 1914-18.

No sensible person could want to put the clock back to that. Consequently, the real problem is to devise a scheme for simultaneous reduction of all kinds of arms that is acceptable to all nations. There can be no disagreement upon the need for general disarmament. It is most earnestly to be hoped that an effective nuclear test-ban treaty may become the means of attaining it.



A Hunter FGA.9 of No. 54 Squadron, Waterbeach, lets loose a full salvo during a rocket-firing exercise. No. 54 comes under 38 Group, R.A.F. Transport Command