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17th January 1983

Prime Minister

To note.

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In his letter of 30th December, your private secretary said that you had seen JIC(82)12 about improvements in Warsaw Pact low level air defence and had asked about the status of our own laser and non-nuclear electro-magnetic pulse (NNEMP) weapons.

Dealing first with laser weapons, the first UK studies of such a weapon were started more than 20 years ago. Since 1972, when the Americans revealed a major breakthrough in high power laser technology, there has been a continuous information exchange between the US and the UK in areas of direct interest to us - and we have also been able to keep in touch with developments, e.g. space and related applications, not formally covered by the exchange agreements. In 1974 a British programme was started on damage and propagation effects. By the end of 1979, it had become evident to us that British interests lie less with weapons used in high energy lasers than with those using medium power lasers directed against relatively softer targets such as eyes, optics and electro-optic sensors. It was then assessed, as the JIC Report confirmed, that the Russians could be in a position to field such weapons by the mid-1980s (in fact, the Russians may already have deployed a laser weapon on the cruiser Kirov). Since 1980 therefore our programme has been re-structured to give priority to the consideration of laser sensor damage weapons, covering studies and

The Rt Hon Margaret Thatcher MP



research both on low power lasers and their applications as sensor damage weapons and on vulnerability, hardening and protection of materials, electro-optic sensors and optical systems and eyes.

The present position is that British operational analysis and battlefield simulation studies have confirmed American conclusions that the deployment of laser sensor damage weapons (LSDW) by the attacking Warsaw Pact forces would confer a benefit to them, in particular by enhancing the effectiveness of the attacking armour. The studies also show that countermeasures can assist the defenders and tactics are possible which minimise the effects. The studies are not yet completed; more work is being done on countermeasures and to consider the threat to our helicopters.

British research has concentrated on countermeasures and there are complementary research and development programmes proceeding at high priority. The research programme, known as "RAKER", aims to think up every possible way of protecting sensors. The development programme, known as "SHINGLE", aims to capitalise on any practical solutions arising out of the "RAKER" work. 19 projects have so far been approved and 7 contracts placed under the SHINGLE programme. Industry have been given several briefings on the threat and our programme and are fully alerted to the problem and contributing effort wherever possible. The British programme is regarded very highly by US workers and we believe that we are as far advanced as they are in achieving methods of hardening and protection. Nevertheless, the task of providing protection for the thousands of sighting systems in service will be a massive one and we are not yet sufficiently advanced with adequate methods of protection to have started the actual process of modification.

So far as offensive weapons are concerned, the major effort is being undertaken in the United States but we are keeping in close touch. At the moment we have no specific programme for procurement



of a UK LSDW. We plan to start studies in 1984 on the value of ownership of laser weapons to our forces, initially to assist the Army in defence against attacking armour and helicopters. We believe it important, however, to keep the LSDW in perspective: it cannot replace existing weapons because its use is restricted to good weather and line of sight, in which circumstances existing weapons are likely to be as effective against the target as a whole. Hence we believe that priority must continue to be given to our air defence and anti-tank guided weapons and the case for LSDW will have to be considered at the time in the light of the resources available. You may recall, however, that we developed and deployed with very great urgency a naval laser weapon, designed to dazzle low flying Argentine pilots attacking ships, to the Task Force in the South Atlantic. This weapon was not used in action and knowledge of it has been kept to a very restricted circle.

non-nuclear electro-magnetic pulse

The position on [↓] NNEMP weapons is less clear. Russian R & D work seems to have concentrated on two basic types of weapons. The first type is a radio frequency (RF) weapon which consists primarily of a very high power microwave radio frequency generator aimed at a target; the second type is a true electro-magnetic pulse weapon in which an explosion, for example chemical, can be made to generate a very high power short duration electro-magnetic pulse, similar in characteristic to but not so powerful as that produced during a nuclear explosion and effective against electronic systems.

As we see it at the moment, these weapons pose a rather less immediate threat. The radio frequency weapon would, like an LSDW, have an instant reaction, which could be used against the electronics of low flying aircraft, though over relatively short range, that is 10 or so kilometres. There is some evidence of Russian interest in the use of an RF weapon in an anti-personnel mode, acting with a debilitating effect against the central nervous system. It is assessed that an effective device could be mounted on a large truck. The EMP weapon, deployed, as the JIC Report suggests, in the form of an artillery shell or missile, might pose a threat to NATO radars and communications systems but probably less to aircraft - since the warhead would have to get within the sort of range where you might just as well shoot the aircraft down - though it might have a useful



capability against the guidance, target illumination and perhaps fuzing systems of NATO missiles. There is no evidence of a Russian production programme for weapons of this kind.

Fortuitously, all our electronic equipments have for many years been designed against stringent electro-magnetic compatibility standards to prevent them interfering with each other, and these features will also help to protect equipment against radio frequency attack. Furthermore, our more vulnerable equipments are now required to be hardened against the effects of nuclear weapons, including electro-magnetic pulses. If these techniques are applied, it will greatly reduce the vulnerability of the equipment to non-nuclear effects though the application of these techniques undoubtedly does add to costs and thus affects saleability to countries which will not face these threats. Trade-offs have therefore to be carefully considered in every case.

The Americans are regarding with concern the recent information about Soviet capabilities in this field. There is a considerable US effort under way and following a recent technical interchange between US and UK, a very small amount of experimental and theoretical work is being carried out at AWRE on both microwave and EMP pulse generators. The work in the US and the UK is too early to allow formulation of Service requirements and hardware.

I am sending a copy of this letter to Sir Robert Armstrong.

Michael Heseltine

Defence



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Briefing on capabilities of Warsaw Pact May '79