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MINISTRY OF DEFENCE
MAIN BUILDING WHITEHALL LONDON SW1
Telephone 01-~~938 7022~~ 218 2111/3

MO 18/3/8

(This arose from a
reference in 'Transnational
Security'.)

28 January 1980

Dear Michael,

nm *Prime Minister*

(2)

MILITARY USES OF LASER TECHNOLOGY IN SPACE

In your letter of 28th December, to which I am sorry not to have sent an earlier reply, you asked for assessments of the likelihood that lasers could be used in space, specifically in an ABM role; and of the present state of Soviet research.

From the work done so far on high powered lasers in the western world we know that a laser of adequate power can be made to operate on an experimental basis and can be pointed with sufficient accuracy at short ranges for long enough to cause damage to the most vulnerable parts of a guided weapon. There are, however, major practical difficulties to be overcome before such a system could be developed as an effective weapon, and while the possible use of such a laser in space in an ABM role is not ruled out, the earliest application we see is for self defence by naval vessels against air attack. Another would be to defend ground targets such as airfields.

In favourable weather the range of a Laser Damage Weapon at ground or sea level would be about 10 kilometres. Adverse weather such as fog and cloud can reduce this range by scattering the beam. High standards of engineering would be needed to ensure accurate aiming of the laser beam for the 2 or 3 seconds necessary to achieve significant damage to the guidance system of the attacking weapon. Also, because Laser Damage Weapons are not very efficient users of energy, large quantities of heat, of the order of a megawatt or more, and waste gases would have to be dissipated while a Laser Damage Weapon is operating. A naval ship or a stationary ground-based installation could be designed to do this, but it is as yet far from clear to Western eyes that such a weapon would be cost effective or offer any significant advantage. An installation in space would be more complex and probably highly vulnerable but because losses during propagation of the beam would be much reduced, it is possible to envisage an increase in operating range to perhaps 1000 kilometres. Again it is too early to say that such a system has any significant advantage to offer.

/The

M O'D B Alexander Esq
10 Downing Street

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The Soviet Union has been engaged for about 10 years in a research and development programme on Laser Damage Weapons. This work, funded on a scale comparable with the United States programme (which now runs at about \$300M per year) has met with some success, particularly in developing high powered lasers. We are less certain about Soviet ability to track targets and to point and aim the laser beams with the accuracy recently demonstrated by the United States. The Russians are regarded as less advanced in techniques for reducing the size and weight of their high powered lasers, but against this we have to acknowledge their willingness and ability to engineer their equipment on a large scale if necessary.

We believe that most of the Soviet research and development work has been directed towards the use of Laser Damage Weapons for self defence by ships, large aircraft and important ground installations against air attack. A ground-based high powered laser system might also be used by the Soviets in an ABM role. We have some uncorroborated evidence that they have been examining the feasibility of locally heating part of the re-entry vehicle of a ballistic missile just before it re-enters the atmosphere, so as to make it unstable during re-entry and to miss the intended target. A ground-based laser system exists which might be intended for use in such a role but again I have to emphasise that there is a fair amount of uncertainty and speculation in this.

The most likely uses the Russians will have for high powered lasers in space are believed to be against satellites. There is already some supporting evidence but we are unlikely to see any substantial realisation of such a Laser Damage Weapon for the Soviet R & D programme before the 1990s.

The FCO may wish to offer comment, but I should add that the use of lasers in an anti-satellite or ABM role is limited by arms control agreements. The use of high energy lasers against satellites would contravene the 1967 Outer Space Treaty, while the ban in SALT I on interference with national technical means of verification would be violated by any action against satellites monitoring compliance with that agreement. Since 1978, the US and USSR have been engaged in bilateral negotiations to ban anti-satellite warfare. Under the ABM Treaty, the deployment of lasers in an ABM role (but not their development) is banned. Before lasers could be deployed for ABM purposes, the Parties would be obliged to consult and would probably have to amend the Treaty.

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I am sending copies of this letter to George Walden (FCO) and David Wright (Cabinet Office).

Yours and

Brian Norbury

(B M NORBURY)

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