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NOTE FOR THE RECORD

Strategic Defence Initiative

The Prime Minister had a discussion of the progress of US work on the Strategic Defence Initiative with Professor Norman (Chief Scientist, MOD) this evening.

Professor Norman said that a review of all recent available evidence showed that the US conception was that of a layered system. Surveillance and identification would be performed by 8 satellites in geosynchronous orbit at a height of 36,000 km. Tracking would be carried out by 20 satellites placed at a height of about 10,000 km. Each would be armed with 3 sensors: 2 infra-red and 1 radar, the last operating on a very long wave length of 10/20 microns. Battle Station satellites would be a good deal lower, probably at 1,000 km height. At least 100 and probably more would be required. They would need to be able to operate over a range of up to 4,000 km.

The most favourable moment to mount an attack against hostile ICBMs would be during their boost phase when the missle and all its warheads and decoys were together. But this would last some 3-5 minutes only. There would be a further period of 7-10 minutes during which warheads and decoys were deployed, followed by another 10-15 minutes of flight by those outside the earth's atmosphere. The re-entry phase would be very brief, perhaps only one minute. The Americans were concentrating on destroying ICBMs during the first two phases. They did not seem to have given much attention to terminal defence.

Three types of weapon were under research for disabling ICBMs: Kinetic Energy weapons, Directed Energy weapons and Particle Beam weapons. The last category did not appear at all promising.

There were in turn three types of Kinetic Energy weapons, all of which would be satellite launched:

(i) a small projectile weighing about 5 kg which would be rocket-launched and propelled, travelling at 6 km a second. This was already in the proving phase (the Homing Overlay Experiment). It would have infra-red guidance.

(ii) an electric rail-gun launched missile. This would be smaller, probably about 1 kg, but would travel at about 30 km per second.

(iii) a missile driven by a laser. This would be tiny, about 10 grams, but could be accelerated up to 200 km a second.

Laser weapons fell into four categories:

(i) a hydrogen fluoride laser. Great difficulties had been experienced with focussing this.

(ii) a nuclear-powered X-ray laser. The Americans appeared to be paying particular attention to this option, which in essence involved generating a small nuclear explosion to drive a laser beam.

Both these two alternatives would be space-based. The other two options would be ground based and involved firing lasers at mirrors in geosynchronous orbit at 36,000 kilometres. These would in turn reflect the laser beam on to fighting mirrors and from them to the target. There were immense problems with the technology and particularly the high altitude mirrors which would need to be some 25 metres in diameter.

Professor Norman summed up US progress by saying that they were very advanced on individual components, but not on the management of the system as a whole. The software which would be needed was far beyond anything conceivable in the present state of the art. There were also major technical problems in the fields of optics and vast amounts of energy needed for laser weapons.

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