A TREATY LIMITING ANTISATELLITE WEAPONS

by

Richard L. Garwin

IBM Thomas J. Watson Research Center
P.O. Box 218
Yorktown Heights, NY 10598

(914) 945-2555

(also
Adjunct Professor of Physics,
Columbia University;

Andrew D. White Professor-at-Large,
Cornell University;

Adjunct Research Fellow,
Kennedy School of Government,
Harvard University)

May 18, 1983

Testimony for a subcommittee
of the
Senate Foreign Relations Committee

Thank you for the invitation to present my views in support of the improved national security to be obtained by limitations on the possible threat to our satellite systems, so important now to our society, to our conventional military capability, and especially to our confidence in understanding the world and in avoiding developments which might lead to nuclear war.

I testified to this Committee September 20, 1982, urging the U.S. Government to conclude with the Soviet Union an agreement effectively banning testing of antisatellite weapons, and banning the deployment of weapons in space. It is important to limit the evolution of Soviet antisatellite capability, and continued use of U.S. satellites in peace and in war is much more important to the U.S. than the freedom to test our own ASAT system. A bilateral ASAT treaty drafted with the goal of becoming an international agreement should have no difficulty in gaining wide support, after it entered into force between the U.S. and the Soviet Union. At that Hearing I indicated that it would be useful for even a private group to consider an appropriate text, and I am grateful to the Union of Concerned Scientists for providing the text which has been presented by Dr. Gottfried, and which I support.

Since the 1950s, I have been involved in military and civil space activities, as well as with the evolution of our ICBM and SLBM forces, with the R&D program on ballistic-missile defense (BMD), and with the assessment of the balance between the U.S. and the Soviet Union. I have participated, on behalf of the U.S. Government, in international negotiations to prevent surprise attack, to limit the testing of nuclear weapons, and I have studied such matters for many years for the Department of Defense, for the White House, and for other government agencies.

A close reading of this draft treaty shows, of course, that it forbids actual attack on satellites of other states (Article I). That in itself would be little comfort to us; like a renunciation of the use of force, abjuring attack on satellites without limiting testing and readiness and without maintaining vigilance about the potential threat would hardly add to our security. But this Article I motivates the rest of the Draft.

The real teeth and protection of the Draft reside in Article II, banning the placing of ASAT weapons in orbit (II.1), and banning the testing of such weapons in space or against space objects. This would ban any further test of the Soviet ASAT, which has apparently been tested in only a very limited range of orbital inclinations, and which is said to have had only about 50% success rate. It would also ban space tests of the U.S. MHV (miniature homing vehicle)-- the key element of the F-15 aircraft-launched ASAT now nearing test phase. Furthermore, it would ban tests of ground-based lasers against satellites, as well as the testing of space-based lasers which otherwise might be claimed to be ASAT-oriented but which were in fact a Soviet program which might evolve to BMD capability.

The ban on stationing weapons in orbit would effectively bar the emplacement of space mines-- small satellites carrying conventional explosives (like a Claymore mine), which from a modest distance of a kilometer or less could be commanded instantly to destroy the satellite it had accompanied for weeks or months. No existing agreement bans the emplacement of space mines, and that is a critical threat to the survival of U.S. satellite systems in conventional war or at the outbreak of nuclear war.

Verification by national technical means (NTM) would, of course, include the use of existing radars, optical telescopes, satellite sensors, and the like, with which the U.S. monitors compliance with existing arms control agreements. It would become worthwhile also to make specialized observation systems to determine whether Soviet satellites were being heated by ground-based lasers, to provide close-in photographs of maneuverable space objects, and the like. In general, it is much easier to detect a violation of such a treaty than to determine which of an enormous array of permitted activities (in the absence of a treaty) are a threat to U.S. security.

ASAT STATUS

The December 1982 Committee Print, "Soviet Space Programs: 1976-80," describes the Soviet ASAT as weighing some 3300 kg, and being launched by an "F-1-m" rocket assembly from Tyuratam into orbits of inclinations varying from 62 to 65 degrees, or so. The F-1 is said to be derived from the SS-9, the monster predecessor of the current SS-18 ICBM. The Print lists 17 tests of the Soviet ASAT, with indifferent success reported. To extend the altitude range of a co-orbital interceptor from low earth orbit to circular synchronous orbit requires almost 4 km/s additional velocity, and that would require an additional stage of propulsion about five times as large as the entire F-1 booster.

The U.S. ASAT program will use an MHV propelled by the booster from the Short-Range Attack Missile (SRAM), on which is mounted an Altair rocket. The system is designed for intercept of satellites in low earth orbit, not by going into orbit and making small adjustments to attack the quarry, but by "direct ascent," a far more difficult approach requiring extreme accuracy in position and time. This approach, however, allows destruction of a satellite with MHV lobbed to orbital altitude, without requiring orbital velocity-- a saving of about a factor 3 in launch weight (on top of the factor 100 which arises because the MHV is so much smaller than the Soviet ASAT vehicle). The F-15 fighter aircraft and the earth's rotation add another 1.4 km/s.

The F-15 ASAT, technically, will be able to operate from any ordinary airfield, given adequate command and control, so that satellite intercepts in LEO could take place, in principle, within an hour of the command to perform them. The Soviet ASAT, thus far launched only from a single complex, would have to wait until the earth turned to bring the launch site under the satellite orbit-- as much as 24 hours. Upgrade to attack satellites at geosynchronous altitude (GEO) would require a very large booster to carry the Soviet ASAT, while a 16,000-lb system, still carried on the F-15, would handle the MHV approach. To stop testing right now will leave the U.S. closer to an effective all-altitude ASAT capable of attacking large numbers of satellites than it will leave the Soviets; but it will leave both sides comfortable that months must elapse after an abrogation of the treaty before such an effective capability can exist.

I emphasize the urgency of stopping the evolution of ASAT systems. On February 24 of this year, Professor Carl Sagan and I prepared a "Petition For A Ban On Space Weaponry," which I hope can be introduced into the record. More than 40 physicists, space scientists, and strategists have joined us "... in urging the United States, the Soviet Union and other spacefaring nations to negotiate, for their benefit and for the benefit of the human species, a treaty to ban weapons of any kind from space, and to prohibit damage to or destruction of satellites of any nation." We cabled the petition March 26 to the leaders of France, India, Japan, the Peoples Republic of China, the Soviet Union, the United Kingdom, and the United States. In the petition we noted specifically the continuing tests of the Soviet ASAT, and the imminent test of the U.S. system.

In no way can we negotiate for the United States Government, but we would be remiss if we did not use our experience and our knowledge to provide our best judgment to the leaders of the world who are capable of action to reduce the threat of conflict in space.

We have received only one response thus far, from Secretary Andropov, which I append. We have responded, emphasizing that "significant steps towards a practical and equitable treaty banning space weaponry would be greatly aided if the USSR would publicly state that, as part of a comprehensive treaty banning space weaponry, it would be willing to forego tests of any anti-satellite system it may have developed or deployed, provided the United States made an identical commitment."

Senator Pressler and colleagues, we can urgently negotiate a treaty along the lines of the Draft presented here, or we can see the wealth and security of our nation imperiled by a needless conflict in space, brought about by a greater desire for advantage than for mutual benefit, and fostered by emerging doctrine and organizations which regard space as an opportunity for conflict rather than the marvelous tool and environment which it is. We can try to make space safe for all non-weapon activities, or we can risk our own continued military and civil use of space. Negotiation, without further ASAT tests, is an opportunity we will not have much longer.

FN: 137/TEST

Brief Biography of Richard L. Garwin
May 17, 1983

Richard L. Garwin was born in Cleveland, Ohio, in 1928. He received the B.S. in Physics from Case Institute of Technology, Cleveland, in 1947, and the Ph.D. in Physics from the University of Chicago in 1949.

After three years on the faculty of the University of Chicago, he joined IBM Corporation in 1952, and is at present IBM Fellow at the Thomas J. Watson Research Center, Yorktown Heights, New York; Adjunct Research Fellow in the Kennedy School of Government, Harvard University; Andrew D. White Professor-at-Large, Cornell University; and Adjunct Professor of Physics at Columbia University. In addition, he is a consultant to the U.S. government on matters of military technology, arms control, etc. He has been Director of the IBM Watson Laboratory, Director of Applied Research at the IBM Thomas J. Watson Research Center, and a member of the IBM Corporate Technical Committee. He has also been Professor of Public Policy in the Kennedy School of Government, Harvard University.

He has made contributions in the design of nuclear weapons, in instruments and electronics for research in nuclear and low-temperature physics, in the establishment of the nonconservation of parity and the demonstration of some of its striking consequences, in computer elements and systems including superconducting devices, in communication systems, in the behavior of solid helium, in the detection of gravitational radiation, and in military technology. He has published about 100 papers and been granted 27 U.S. patents. He has testified to many Congressional committees on matters involving national security, transportation, energy policy and technology, and the like. He is coauthor of the books Nuclear Weapons and World Politics (1977), Nuclear Power Issues and Choices (1977), Energy: The Next Twenty Years (1979), and Science Advice to the President (1980).

He was a member of the President's Science Advisory Committee 1962-65 and 1969-72, and of the Defense Science Board 1966-69. He is a Fellow of the American Physical Society and of the American Academy of Arts and Sciences; and a member of the National Academy of Sciences, the Institute of Medicine, the National Academy of Engineering, the Council on Foreign Relations, and the American Philosophical Society. The citation accompanying his 1978 election to the U.S. National Academy of Engineering reads "Contributions applying the latest scientific discoveries to innovative practical engineering applications contributing to national security and economic growth." He was awarded the 1983 Wright Prize for interdisciplinary scientific achievement.

He is a member of the Council of the Institute for Strategic Studies (London), and during 1978 was Chairman of the Panel on Public Affairs of the American Physical Society.

His work for the government has included studies on antisubmarine warfare, new technologies in health care, sensor systems, military and civil aircraft, and satellite and strategic systems, from the point of view of improving such systems as well as assessing existing capabilities.

FN:BIOG