Next 5 Page(s) In Document Denied

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Arnold Engineering Development Center

Page 44

German Study Encourages Development Of Antitactical Ballistic Missiles

By Michael Feazel

Bonn—Soviet Union has tested conventionally armed tactical ballistic missiles, more destructive conventional warheads and an antimissile version of its SA-12 antiaircraft missile, potentially giving it the ability to launch a conventional preemptive strike that would destroy all major command, control, sensing and antiaircraft assets in Europe, according to a new German study.

The testing increases pressure for development of a new antitactical ballistic missile (ATBM) system in Europe, according to the Konrad Adenauer Foundation here. The system probably would be based initially on an upgraded version of the Raytheon Patriot surface-to-air missile, but could eventually use more exotic weapons such as directed energy weapons and electromagnetic rail guns.

The ATBM also could use other technology derived from the U. S. Strategic Defense Initiative research program—primarily advanced sensors and command and control technology, the report said. But the government-financed foundation, which is affiliated with the governing Christian Democratic Party, said studies on ATBMs began before President Reagan proposed the SDI and the requirement for ATBMs is unrelated to SDI.

The report is intended to encourage public support for the ATBM systems, but it also includes extensive information from the North Atlantic Treaty Organization-sponsored AGARD studies of ATBM systems. AGARD (Advisory Group for Aerospace Research and Development) produced a classified report on ATBMs in 1980 and has updated it regularly since. The information on Soviet testing comes from NATO and German government sources.

The Soviet testing detailed in the report encompasses three categories:

- The Soviet Union has tested a conventionally armed version of its SS-12 Scaleboard tactical ballistic missile. Conventionally armed SS-1 Scud tactical ballistic missiles have been used in the Iran-Iraq war.
- Air-dropped Fuel-Air Explosive (FAE) conventional explosives have been tested in Afghanistan. An FAE bomb dropped from an aircraft caused destruction throughout a 400-meter (437-yard) radius. The FAE warhead, along with chemical weapons, makes conventionally armed ballistic missiles more feasible.
- The SA-12 Gladiator antiaircraft missile has been tested against a Scaleboard surface-to-surface ballistic missile in Soviet tests. The improved SA-12 Giant with ATBM capability, which is in the experimental phase, is expected to approximately equal the effectiveness of an improved Patriot, foundation officials said.

Tests of conventionally armed ballistic missiles have been so successful that the Soviet Union is expected to begin equipping SS-21 and SS-23 missiles with conventional warheads "in the very near future," the report said.

Available Warheads

As part of the AGARD study, experts at NATO's Supreme Headquarters Allied Powers Europe estimated as many as 40% of all Soviet ballistic missiles may eventually be equipped with conventional warheads. The foundation report said as many as six different conventional warheads for ballistic missiles may already be available to the Soviets for each tactical ballistic missile type.

The potential for conventionally armed ballistic missiles will further strain Europe's air defense system, the report said. "The air defense situation in Europe already is almost catastrophic," Thomas Enders, defense analyst for the Adenauer Foundation and author of the report, said. "Until now NATO has been relying on many weapons which have been outdated since the late 1960s. The Patriot is helping some, but the ballistic missiles cause problems all over again. We have to make the next step to extended air defense."

The conventional ballistic missile warheads are considered a particularly dangerous new threat because they could allow the Soviets to launch a nonnuclear strike that could eliminate virtually all NATO command and control and air defense assets. Until an ATBM system is deployed, NATO is defenseless against such attacks.

Conventionally armed ballistic missiles have not previously been considered economically justifiable because they were not accurate enough to guarantee the destruction of the high-value targets at which they would be aimed.

Improvements in Soviet missile accuracy, combined with the new conventional warheads, are making the conventional ballistic missiles easier to justify, according to the foundation study. It said the U. S. estimates a circular error probable (CEP) of about 30 yards for Soviet SS-21 and SS-23 missiles.

The wide radius of destruction of FAE warheads is decreasing the accuracy requirement at the same time. "In the event of an attack with high-accuracy short-range ballistic missiles, the overpressure

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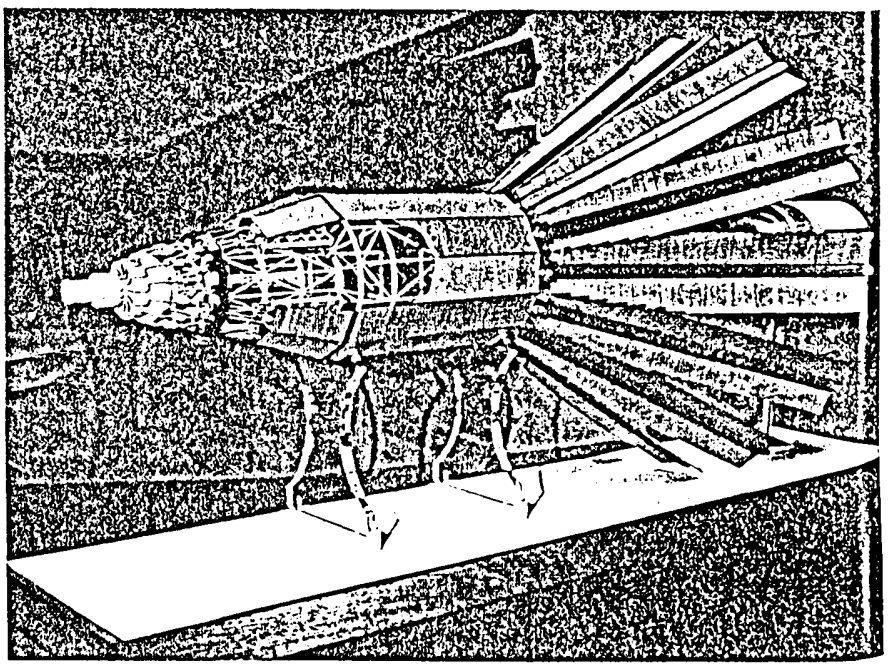

generated by an FAE warhead would be sufficient to damage above-ground concrete structures such as aircraft shelters and ammunition bunkers, and perhaps even underground command posts," the report said.

The report said German Defense Minister Manfred Woerner's proposed Extended Air Defense System for defending against tactical ballistic missiles is more feasible than the proposed European Defense Initiative. EDI, which is endorsed by groups such as High Frontier-Europe, would rely more immediately on both directed energy weapons and space-based defenses.

"The purpose of this report was to get the discussion focused on extended air defense instead of EDI," Enders said. "There is strong opposition to SDI in Germany, so there is a need to separate the two. We could not successfully conduct the antitactical missile discussion unless we could get away from SDI."

Woerner convinced other NATO defense ministers to continue studies of the Extended Air Defense System during a meeting in Brussels in May (AW&ST June 2, p. 69). The next step is for the NATO nations to agree on a threat analysis saying conventionally armed ballistic missiles are an important threat.

General Electric SP-100 space nuclear reactor is being designed to provide 100-300 kw. over a period of 10 years for various U. S. space-based systems. The fast spectrum, liquid lithium cooled SP-100 reactor will use thermoelectric conversion techniques, but the basic reactor design is compatible with dynamic conversion systems, such as Stirling engines, that could produce power levels in excess of a megawatt in the future, according to General Electric officials. Reactor thermal energy in the SP-100 is transported by a primary pumped liquid loop to the area along the inside of the conical main power generation section. It is then transferred to thermoelectric conversion assemblies mounted on the inside of the radiator panels that surround the 12-sided cone. The system could be used to power various Strategic Defense Initiative systems in space and is considered essential by the U. S. Air Force and Navy as the power source for a space-based wide area surveillance radar, long desired by both services. Critical design review is scheduled for 1988. Testing will begin in 1991 at the Hanford Engineering Development Laboratory, Hanford, Wash.

For Germany, the next step would be acquisition of an upgraded software package that would improve the Patriot's self-defense and point-defense capability against ballistic missiles. If the software development to allow the missiles' fire control system to deal with ballistic missiles' higher speeds is successful and the U. S. Army acquires it, Germany "almost certainly" will do the same in the late 1980s, Enders said. That could be followed by an improved Patriot warhead in the early 1990s.

Upgraded Radar

An upgraded radar also would be necessary to make the Patriot fully effective against ballistic missiles. The Patriot would either have to have a second radar sweeping the ballistic approaches or the original radar would have to be equipped to move quickly from its normal horizon sweep to an elevation of about 70 deg.

The nations also are considering equipping the Patriots with an additional boost stage to improve its velocity. The additional boost stage would require new launchers. The additional velocity would be most important for intercepting longer-range missiles such as SS-20s, which have more exoatmospheric flight and higher speeds. Current Patriot speeds probably would be adequate for shorter-range tactical ballistic missiles.

The improved Patriots can be particularly effective in a "mission kill" role against conventional ballistic missiles, the foundation said. The Patriot could carry out a mission kill by deflecting an incoming conventional warhead too far from its target to be effective, since high accuracy is needed for a conventional attack.

Some SHAPE planners have said equipping Patriots and other surface-to-air missiles for ballistic missile defense could make them too expensive to use against conventional aircraft and cruise missiles. The foundation study does not estimate the cost of improved Patriots.

"We have no idea of the cost," Enders said. "But if it is feasible to make them multifunctional [against aircraft as well as ballistic missiles] it would certainly be much less expensive than having two separate systems."

The nations also could decide to upgrade only a limited number of Patriots for the more expensive antimissile role, Enders said. "The big question is mix," he said. "That is not only the mix between antimissile and antiaircraft, but between active missile defense and passive measures such as hardening and mobility."

The Raytheon Hawk air defense missile might be upgraded to have some antimissile capability, but "the system could only acquire a limited self-defense capability if any against tactical ballistic missiles," the report said. Predevelopment phase work is also being done on a "medium-SAM" replacement for the Hawk for deployment in the late 1990s which could have ATBM capability. Work is being done at Messerschmitt-Boelkow-Blohm and Aerospatiale (AW&ST Apr. 21, p. 75).

The extended air defense system is not conceived as a blanket defense for all of Europe. Instead, it would focus primarily on point- and area-defense protecting the high-value targets that would be the most likely targets for conventionally armed ballistic missiles. The system would be equally effective against nuclear-armed missiles, and designers said it probably would be impossible to tell the difference between nuclear and conventional warheads in flight.

ATBM capability against nuclear warheads has raised questions about whether the extended air defense system would violate the Anti-Ballistic Missile Treaty. The report said the treaty would not be violated because it applies only to strategic weapons and the ATBM would have a significant capability only against shorter-range tactical missiles.

'Disproportionate Share'

The U. S. is encouraging ATBM activity in Europe, but has decided against taking a leading role. The report said the U. S. is willing to pay "a disproportionate share" of the costs and already has agreed to finance system architecture studies. "The first step toward such a venture, however, would have to be made by the Europeans since Washington was tired of advancing proposals for the defense of Europe, only to be subsequently vituperated by the Europeans," the study said.

The study encourages continued research on both rail guns and directed energy weapons, but said neither is likely to be effective before the turn of the century.

NATO should not rely only on ATBM defenses, Enders said. He said the Western allies also should be working on their own conventionally armed ballistic missiles, probably based on Patriot or Lance boosters, for use against high-value Soviet targets such as airfields and communications centers. Such a deployment is likely to face political opposition, however. "In the light of the agonizing [Pershing 2 and cruise missile] debate in the early 1980s, it is doubtful whether [such a] response is still available or politically feasible," the foundation report said. □

Next 3 Page(s) In Document Denied