

DOCUMENT RESUME

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TRESTLE Electromagnetic Pulse Simulator Program Should be Reevaluated (Unclassified Digest of a Classified Report). PSAD-77-159; B-165546. November 4, 1977.

Report to the Congress; by Robert P. Keller, Acting Comptroller General.

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Organization Concerned: Department of the Air Force.

Congressional Relevance: Congress.

TRESTLE is a special Department of the Air Force facility now under construction originally designed to simulate threat-level, electromagnetic pulse stresses on large aircraft generated by a high-altitude detonation of a nuclear weapon. Program costs have increased by 130%, or \$34 million. Findings/Conclusions: Because of technical problems, TRESTLE will not meet its original objective of being a threat-level simulator and, if completed as currently planned, could not provide test results to confirm that an aircraft can survive threat conditions and still meet its mission. Its use is further questionable because it will not be available for timely testing of prime candidate aircraft. Recommendations: Due to the expected inadequate technical performance, the unreliability of extrapolation techniques to predict system survivability in the absence of threat-level testing, schedule delays, and the recent termination of the production portion of the B-1 strategic bomber program, the Secretary of Defense should withhold further expenditures of TRESTLE funds and make a cost and benefit study to determine how or if the program should continue. The Congress should require the Secretary of Defense to justify continuation of the program. (Author/SC)

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COMPTRROLLER GENERAL'S  
REPORT TO THE CONGRESS

TRESTLE ELECTROMAGNETIC  
PULSE SIMULATOR PROGRAM  
SHOULD BE REEVALUATED

D I G E S T

Should the Secretary of Defense discontinue funding and reevaluate the TRESTLE program? GAO thinks so.

TRESTLE is a special Department of the Air Force facility now under construction originally designed to simulate threat-level, electromagnetic pulse stresses on large aircraft generated by a high-altitude detonation of a nuclear weapon. Program costs have increased by 130 percent, or \$34 million; that figure accounts for the cost of only part of the originally designed facility. GAO believes that, because of technical problems, TRESTLE will not meet its original objective of being a threat-level simulator and, if completed as currently planned, could not provide test results to confirm that an aircraft can survive threat conditions and still meet its mission. Its use is further questionable because it will not be available for timely testing of prime candidate aircraft. (See pp. 8 and 14.)

TRESTLE PROGRAM AND ELECTROMAGNETIC  
PULSE THREAT

The need for an electromagnetic pulse simulator like TRESTLE is based on the assumption that an enemy could detonate one or several nuclear weapons outside the atmosphere somewhere over U.S. Forces. This type of nuclear detonation would generate an intense electromagnetic field that could cover a large area with energy, referred to as electromagnetic pulse. The pulse could disable electric and electronic systems as far as 3,000 miles away from the nuclear burst(s). (See pp. 1 and 14.)

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The Air Force is concerned about the inherent vulnerability of modern electronic equipment in Air Force systems to the far-reaching effects of electromagnetic pulse. Because of this concern, TRESTLE was designed to simulate the threat condition for testing the B-1 Strategic Bomber, perhaps the Advanced Airborne Command Post aircraft, and the Airborne Warning and Control System aircraft. The Air Force is also conducting and sponsoring research to gain a better theoretical understanding of electromagnetic pulse effects on electric and electronic systems. (See pp. 4, 6, and 10.)

## PROGRAM CHANGES--COST, SCHEDULE, AND PERFORMANCE

Originally TRESTLE included two simulators--horizontal and vertical--with wooden access ramps and test stands strong enough to hold the aircraft on a platform high above the ground. The program cost estimate has risen from \$26 million for both simulators to \$60 million for the horizontal simulator only. The Air Force has obligated \$35 million for this program through fiscal year 1977. (See pp. 6 and 8.)

Although program cost increases can be attributed, in part, to inflation in material and labor costs, a large part was caused by management's underestimating the technical complexity of the test facility resulting in redesign. As program cost estimates increased, facility completion dates were moved to later dates and major reductions were made to TRESTLE's technical performance capability to help keep within Air Force funding levels. (See p. 8.)

The operational date of the horizontal simulator has been delayed from July 1975 to February 1980. The construction of the vertical simulator has been deferred indefinitely. Reductions in technical performance limitations have reduced TRESTLE to an electromagnetic pulse simulator with less than threat-level capability. Without threat-level testing to confirm system survivability, neither analysis nor subsequent extrapolation to

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threat level can be used to reliably predict survivability of the complex aircraft systems. (See p. 14.)

If TRESTLE is to provide a threat-level, electromagnetic pulse simulation for aircraft in simulated flight, it must produce a pulse with an intense electric field strength that develops in less than one-billionth of a second. TRESTLE will not adequately perform this simulation. Generation of the intense electric field strength is not a great technological problem but is limited mostly by cost considerations. Releasing this energy to represent the fast rise time of the pulse, however, is a problem because of inadequate high-voltage switch technology. The slower rise time thus eliminates TRESTLE's capability to simulate the threat-level, electric field strength at high frequencies.

In addition to the technical limitation problem, another problem in achieving TRESTLE goals is timeliness, since TRESTLE will not be available for timely testing of prime candidate aircraft. The timeliness problem is severe for the Advanced Airborne Command Post and the Airborne Warning and Control System since production of these systems will be almost complete before testing in TRESTLE can be conducted. A major aircraft program planned for TRESTLE testing was the B-1 Strategic Bomber. The B-1 bomber production program, however, was halted by the President of the United States in June 1977. (See pp. 12 and 14.)

## RECOMMENDATIONS

GAO recommends that, because of expected inadequate technical performance, the unreliability of extrapolation techniques to predict system survivability in the absence of threat-level testing, schedule delays, and the recent termination of the production portion of the B-1 Strategic Bomber program, the Secretary of Defense withhold further expenditures of TRESTLE funds and make a cost and benefit study to determine how or if the program should continue. (See p. 26.)

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## AGENCY COMMENTS

The Department of Defense disagreed with the conclusions and recommendations in GAO's preliminary report. (See app. I.) It concluded that no circumstances existed which would justify suspension of TRESTLE funding or initiation of additional studies. (See p. 27.)

## MATTERS FOR CONGRESSIONAL ATTENTION

This report provides the Congress with an independent appraisal on the status of the TRESTLE electromagnetic pulse simulator program and will be of use in determining whether the program should continue. The TRESTLE experienced cost increases and schedule delays and is expected to perform below the technical performance levels needed to simulate the threat for testing large U.S. aircraft weapon systems in an electromagnetic pulse environment.

The Congress should require the Secretary of Defense to justify continuation of the program.