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OPERATIONAL LESSONS LEARNED

LESSON ONE

From its beginning, the Talos missile system was conceived as a long-range weapon system. Its propulsion method would have supported still more range than the guidance concepts on which it was based, and its time-to-target was respectably low. The range capability was double or triple that of contemporary naval surface-to-air systems. As the nature of air attack changed from gravity bomb delivery at relatively short range to air-to-surface missiles launched at considerable standoff, Talos promised the ability to reach the enemy's launch aircraft and their jamming support before their antiship missiles were launched. Talos' range capability would force the enemy to stand off to distances that would severely reduce the effectiveness of their antiship weapon delivery. We were proud of the technical achievements of the Talos missile system, but we learned quite vividly that missile systems do not stand alone.

The detection sensors upon which the Talos missile system depended were severely stressed to provide early enough designation to Talos fire control to permit missiles to reach their maximum range capability, especially in a jamming environment. Additionally, the Talos range capability made it a virtually unmanned interceptor, capable of operating in regions where aircraft alone held sway. This posed an additional problem for the search and surveillance components of the air defense system: it was not enough merely to detect approaching enemy aircraft, it was essential to know the movements of friendly aircraft and missiles in relation to each other as well as in relation to enemy aircraft. What we found was that, in general, the defensive system was not up to this requirement, and the problem was "solved" by not using Talos to its full capability, the air defense aircraft being favored due to its established position.

This disuse of long-range missilery, given the existing command and control situation, was probably as large a contributory factor to the demise of the Talos missile system as were the more often stated factors of electronic antiquation and maintenance expense. Had the capability been credible, the age and cost problems would have been solved. This problem of achieving really credible capability still plagues designers of antiair warfare weapon systems. Though weapons have changed, though newer and better sensors have appeared, though superior defensive aircraft have been designed, we still have the problem that good weapons systems are of true military value only if they can be coordinated with the entire ensemble. The secret of this coordination lies in the command and control system, its supporting sensors, its computational power, and its display and communications abilities to gain and make sense of the information about what is going on at great distances from the ships being defended. Talos history provided us with an early identification of a problem that will occupy and plague us for decades to come.

LESSON TWO

Looking back at our experience with the Talos missile system, we are reminded of a basic lesson that runs through all of its history, as well as the history of other missile programs: engineering changes are inevitable, and provisions must be made to accommodate them in an orderly manner. White Sands Missile Range was the only development and test facility nearer the sea than a laboratory bench, but much of the development testing needed to be done at sea. The Talos program never had an at-sea development site, except for the operational ships. That meant that the combatants had to squeeze development test work in with operational commitments. This way of life was acceptable in a programmatic sense only because the number of ships was so small that configuration changes could be kept track of and logistically supported to an acceptable degree. The ships accepted such constraints because it was the only way of getting capability improvements in a timely manner.

Today such methods are unacceptable. Ship classes are too large to be accommodated in such a fashion, and the technical personnel situation will not allow that sort of experimental activity. The lesson learned was that there had to be land-based test sites, combat system development sites, and program maintenance facilities where a much more orderly process of design and development testing could get things well in order before going to sea. The rigors of installation problems needed to be worked out before system components reached the recipient ship and where the details of computer programs could be put in order at relative leisure and without debilitating the ship's operational capability. Thus, we learned that it is not sufficient just to build ships and combat systems; rather, it is essential to consider carefully the need for a complete support system to accommodate orderly evolution of the weapon system.