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August 1969

Report of the Subgroup on EW Effectiveness Evaluation

Office of the Under Secretary of Defense
for Acquisition, Technology, and Logistics
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NOTE

This report was prepared by the Subgroup Chairman, Dr. Larry C. Hunter and includes his personal conclusions and recommendations.

This report summarizes the activities of the Subgroup on EW Effectiveness Evaluation and includes my personal conclusions and recommendations.

Two meetings were held, on 29 October 1968 and 17 December 1968, to bring this subgroup up to date on current U. S. projects and capabilities in modeling, simulation and testing for EW (electronic warfare) effectiveness. Briefings by the Air Force and Navy included COMBAT COMPUTER, COMFY COAT, SNOWTIME/TOPRUNG, and PEGASUS. The Autonetics Model was covered in some detail. The subgroup believes that these briefings were complete enough to give it a reasonable understanding of the current activities to evaluate penetration effectiveness.

An Executive Session was held on 19 February 1969. The major purposes of this session were fourfold: (1) to critique the present efforts in EW effectiveness evaluation, (2) to assess whether the present data base is adequate for this task, (3) to obtain a subgroup position on what overall capability is required and achieveable, and (4) to recommend major areas where additional capabilities are required.

Most members of this subgroup wrote individual memos on these points. (These are available for your review at any time.) Many worthwhile observations and conclusions were expressed. This report to you should be treated as a personal report expressing my conclusions and not a report of the committee as a whole. However, I believe that most of my comments are shared by a majority of the subgroup members. Some of my comments are drawn directly from individual memos of subgroup members.

Before listing conclusions and recommendations it should be mentioned that the techniques required for prediction of penetration are different depending upon the questions that we are trying to answer. At least three decision levels exist. At a high level of decision making we face questions such as: What size bomber force? How many missiles? Answers to all of these are influenced by our estimation of the penetration capability to be expected of our bomber force. But the answers depend even more on our estimates of prelaunch survival, reliability, damage producing capability, cost, and the interactions between them. The influence of delay in national decision, strategic doctrines, and readiness generation time are critical. Interactions for these highest decision level questions are more important than precision of penetration estimates.

There is a different level of question asked by middle decision level of management. Typical questions are: "With what priority should the various penaid items be supported?" and "How should money be divided among the following?"

1. On-board jamming with sophisticated self-protection equipment.

2. Support jamming, less complicated, designed against the surveillance and command and control function.

3. Decoys and/or SCAMs to degrade terminal weapons.

4. Expendable jammers.

More detail and more precision in penetration prediction is required for these medium level questions. The penetration/EW evaluation questions fall in this level.

There is a third and lower level of question. In the R&D and operational areas, we are concerned with detailed questions such as: jamming power, modulation techniques, time to drop chaff, chaff length, decoy cross section, and tactics. These require detailed models, tests and analyses. Knowledge of the output from these analyses is important in the higher level of questions. In fact, one of our serious problems has always been our inability to structure the questions, the models and the tests in an efficient way so that outputs of lower level analyses are useful for the larger questions.

The following conclusions and recommendations on electronic warfare effectiveness/penetration are given mainly from the viewpoint of middle decision level.

Conclusions

1. The present ability in modeling and simulation for EW effectiveness/penetration is very limited. Meaningful answers in EW effectiveness at the middle decision level cannot be provided with the models currently available.

2. The effect of EW on command and control has been universally neglected. The Autonetics model for AMSA assumes near perfect command and control. This fact alone places serious doubts on conclusions derived from the employment of this model for EW effectiveness.

3. The flow of data from Air Force and Navy test and evaluation activities to support EW effectiveness models was very difficult to determine. Apparently, no mechanism has been provided in either Service to provide correlated data from test activities in support of penetration analyses.

4. Standards on what is expected in EW models are not available.

5. There is no management program that coordinates modeling, simulation and evaluation activities.

6. The necessary inputs for EW modeling do not now exist in a collected form. To the degree pertinent operational data is available, it is not well analyzed and filed for ready use in modeling.

Recommendations

It is always easier to critique and draw conclusions than it is to make constructive recommendations. I have already noted that (1) our current capability in modeling to measure EW effectiveness is poor and needs continuing development, (2) that data required for modeling is not available in a collected form (undoubtedly, certain important questions will require extensive efforts by the intelligence community), and (3) that overall management and standards for this important activity are lacking. If the solution to these problems were easily obtainable, the problems would not exist today. The overall solution will require much more time than was spent by this EW subgroup.

Nevertheless, I feel a few definite recommendations are in order at the present time.

1. An understanding of the effect of EW on enemy command and control is so important that I believe programs in this area should proceed without delay. The modeling and sensitivity analysis of Soviet and Chicom command and control system is essential. Virtually no data

exists on the effect of many aircraft penetrating a defense system on command and control degradation.

2. Standards for EW penetration effectiveness modeling must be developed.

3. The development of an overall plan for coordinating modeling, simulation, and evaluation activities is absolutely essential. I believe it is appropriate for DDR&E to have the responsibility for this development.

4. If modeling and simulation are to become reliable tools in helping determine the allocation of defense EW dollars, not only must standards be developed, but the overall management of these areas must be strengthened within the individual Services. At present these efforts are fragmented and not well coordinated.

5. Intelligence data to support modeling/simulation requires close cooperation between modelers and collectors. Continuous feedback between what is needed to complete the model and how it is to be applied to the model is essential. The development of standards and management plan should promote the required cooperation and close working arrangement between modelers and collectors.

6. There are no technical reasons why efforts in model/simulation development cannot be successful and development should be accelerated. Future models must allow flexibility so that sensitivity analysis can be performed to hedge against the uncertainty of intelligence data. Models should also point out where we should go with EW developments and point the way to new penetration concepts.