



SCIENCE, TECHNOLOGY AND GLOBAL SECURITY WORKING GROUP

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September 4, 2012

Representative Michael R. Turner
Chairman,
Strategic Forces Subcommittee
House Armed Services Committee

Representative Loretta Sanchez
Ranking Member
House Armed Services Committee

Dear Representatives Turner and Sanchez:

We are following up on our letter of August 20, 2012 to provide you with additional information about some of the serious errors in the letter dated April 30, 2012 sent to your Subcommittee by the National Academy of Sciences (NAS). The letter from the NAS reports findings from a study titled *Making Sense of Ballistic Missile Defense: An Assessment of Concepts and Systems for U.S. Boost-Phase Missile Defense in Comparison to Other Alternatives*. The particular errors we are discussing herein stem from miscalculations of radar ranges that in turn lead to some, but not all, of the most serious errors in the study's findings and recommendations.

We are attaching two supplemental appendices titled *Supplemental Appendix 3A* and *Supplemental Appendix 3B* that directly expand on the discussion of the errors in the NAS radar calculations we described in *Appendix 3* of our letter of August 20.

We have still heard nothing from the National Academy of Sciences on this matter although we have heard from reliable sources that they have copies of the letter and appendices we sent you on August 20.

In *Appendix 3A* we show that the working range of the Aegis radar against cone shaped warheads will be roughly around 300 km. This range is much too short for the Aegis radars to perform missile defense missions as part of the European Phased Adaptive Approach (EPAA).

The National Academy of Sciences study also incorrectly concludes that,

“Aegis... with launch-and-engage-on-remote...[could] provide an effective... defense for allies and deployed U.S. forces, limited only by inventory, against... intermediate range ballistic missile[s]...”

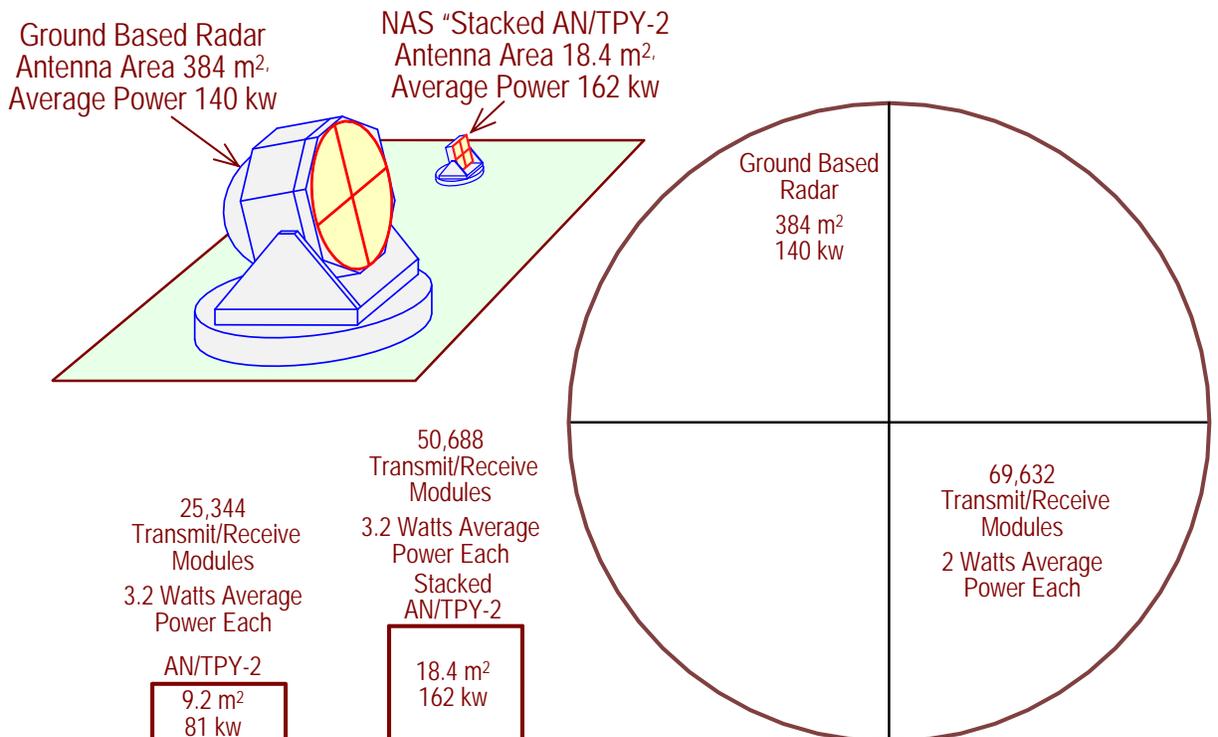
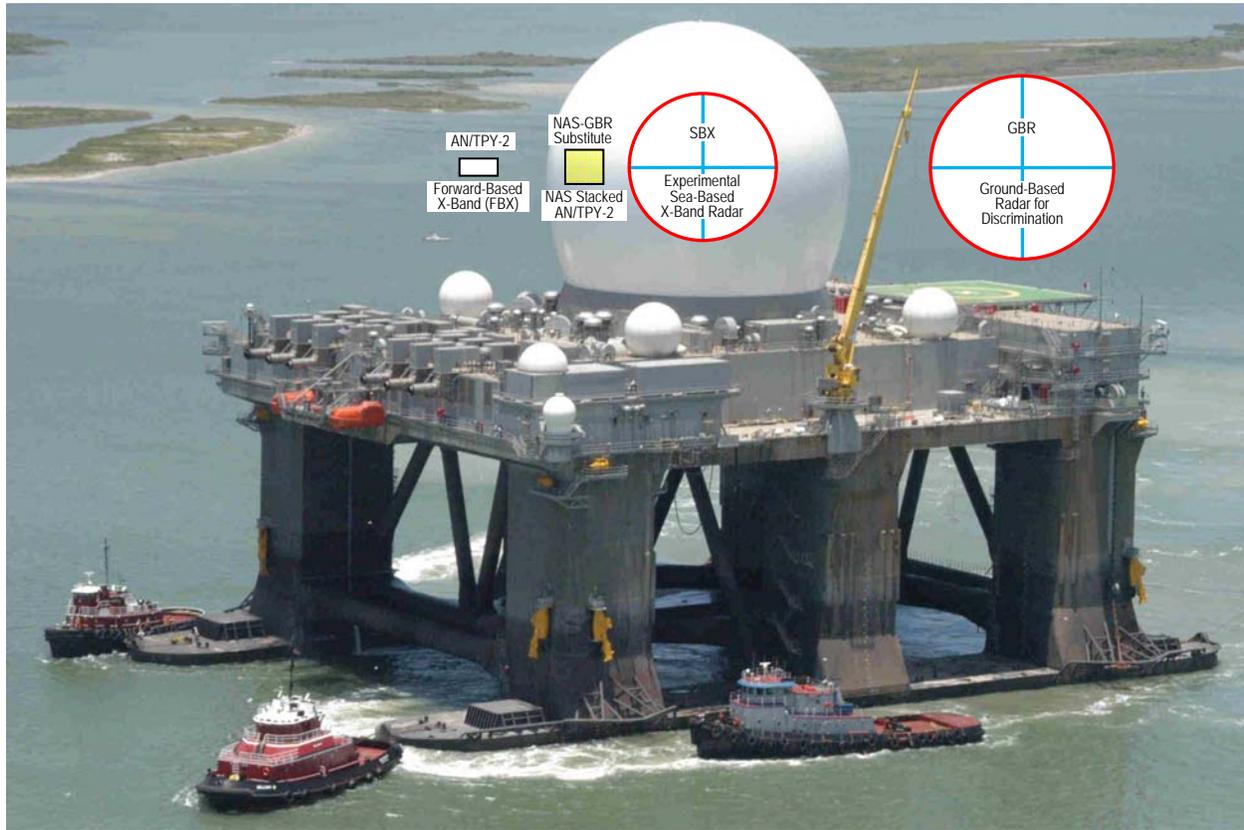
However, engage-on-remote can only work if highly accurate tracking data can be provided to interceptors so they can be launched and guided to volumes in space where they can acquire and home on targets. The Defense Science Board report released in September 2011 pointed out that the EPAA had no sensors capable of providing such precision tracking data to its interceptors. We agree with this conclusion and show in the attached *Appendix 3B* that neither the Aegis nor the AN/TPY-2 radars (or even the stacked AN/TPY-2 radars) would be capable of providing the precision tracking and discrimination data that the EPAA would need to launch interceptors against warhead targets that are accompanied by primitive decoys.

Truly adequate radar support for the EPAA, which would have to include the ability to attempt discrimination measurements, would require a radar on the scale of the SBX (shown on the next page of this letter). Such a radar would still be susceptible to the kind of radar countermeasures described in Appendix 3, but it would at least have the signal-to-noise ratios needed to attempt discrimination measurements at realistic ranges of interest.

The NAS study also proposes pairing stacked TPY-2 radars with existing upgraded early warning radars to provide discrimination data for the GMD national missile defense system. The next page of this letter shows a series of pictures and diagrams that illustrate the very large disparity in antenna size between the stacked AN/TPY-2 and an X-band Ground-Based Radar (GBR) planned in 1999 by the Ballistic Missile Defense Organization for pairing with the upgraded early warning radars. The reason for the very large size of the BMDO-GBR (antenna area of 384 m² versus 18.4 m² for the NAS stacked AN/TPY-2) is the need to provide discrimination data against low-radar-cross-section cone-shaped ICBM warheads.

Figure Caption:

The two figures below illustrate the differences in antenna size and power of the National Academy of Sciences (NAS) "X-Band GBR Replacement" (the Stacked AN/TPY-2) with the X-Band GBR that was planned by the BMDO in 1999 for the same purpose – pairing with the Upgraded UHF Early Warning Radars. For the same operating conditions, the NAS X-Band Replacement would collect a signal roughly 400 times smaller than what would be collected by the BMDO-GBR.



In order to provide discrimination data against cone shaped warheads a radar must be able to observe distinct reflections with radar cross sections of 0.001 m² or less from the body of a warhead. The radar must also be able to observe many tens or even hundreds of targets per second. As shown in *Appendix 3B* these requirements were recognized by the Ballistic Missile Defense Organization when they proposed the BMDO-GBR for the same mission that the NAS-GBR is now being proposed for.

As noted in our earlier letter, if not corrected, the errors in the NAS study will provide misleading information for the national debate over how to proceed with missile defense programs. The conclusions in the letter of April 30, 2012 from the National Academy of Sciences could mislead decision-makers into thinking that the European Phased Adaptive Approach could be made workable with only minor upgrades to radar systems. It could also mislead decision-makers into thinking that support for radar discrimination in the ground-based missile defense system can be achieved with only a relatively minor effort to build stacked AN/TPY-2 radars.

As noted in our earlier letter, we stand ready to work with the National Academy of Sciences to resolve these serious and still not addressed errors in the study they produced for the Congress. We note, however, that the National Academy of Sciences needs to put together a group of true scientific and missile defense experts to review the matters we have raised in this letter and our letter of August 20.

We look forward to discussing these issues with any members of Congress, their staffs, and the press who are interested in obtaining accurate information about the matters that were supposed to be studied in the National Academy of Sciences report.

Sincerely yours,

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