**DEPARTMENT OF THE NAVY**
NAVAL AIR WARFARE CENTER, AIRCRAFT DIVISION
OFFICE OF COUNSEL
47076 LILJENCRANTZ ROAD, BLDG 435
PATUXENT RIVER, MD 20670-1127

IN REPLY REFER TO

5720
Ser NAVAIR-11.5C/FD09-0366
28 June 2010

Mr. John Greenwald, Jr.
[redacted]

Dear Mr. Greenwald,

This letter is in final response to your 22 June 2010, Freedom of Information Act (FOIA) request for a copy of a document entitled "Further Comments on the Feasibility of Airlaunched Anti-Satellite Weapons Systems" dated March 1959, accession number AD311800. Your request and the responsive document was forwarded to Naval Air Warfare Center Weapons Division, China Lake, CA for coordination on the releasability.

We conducted a classification review of the "Further Comments on the Feasibility of Airlaunched Anti-Satellite Weapons Systems" dated March 1959, accession number AD311800 and determined it is no longer classified. The document has been formally declassified and is releasable in its entirety.

All cost associated with the processing of your request is waived because they do not exceed $15.00.

Should you have any questions or concerns I can be reached at (301) 342-9564.

Sincerely,

*/s/ Ruth Yates*

RUTH B. YATES
Freedom of Information Coordinator
Naval Air Systems Command Headquarters
47076 Liljencrantz Road, Bldg. 435
Patuxent River, MD 20670
Voice (301) 342-9564
Fax (301) 342-1292
ruth.yates@navy.mil

[redacted]

AD311800

# FURTHER COMMENTS ON THE FEASIBILITY OF AIRLAUNCHED ANTI-SATELLITE WEAPON SYSTEMS (U)

BUREAU OF AERONAUTICS (NAVY) WASHINGTON DC

MAR 1959



[redacted]

Enclosure (2)

# AD 311800



# NAVY DEPARTMENT

## BUREAU OF AERONAUTICS

### WASHINGTON, D. C.

**RESEARCH DIVISION REPORT NO.** [illegible]

[illegible]

[illegible]



March 1952

## INTRODUCTION

In the never ending military game of achieving and maintaining operational superiority, the advent of the space age and its by-product, the earth satellite, has created the necessity for determining requirements for the development of anti-satellite weapon systems. Studies relating to this subject are being strongly prosecuted by the military establishment. This report will discuss in very broad terms the concept of one type of satellite defense, namely an airlaunched version employing both carrier and water-based aircraft as manned, recoverable stages. The feasibility of such a system will be examined in broad context, more with the idea of stimulating thought than with the preliminary design of a weapon system.

## SUMMARY AND CONCLUSIONS

A brief investigation has been made of two modes of airlaunching anti-satellite missiles, one utilizing carrier-based concepts, the other utilizing a seaplane platform.

The scope of the investigation was not intended to be detailed enough to draw technically sound conclusions. It appears however, that in broad context, and in the sense of current related analyses, that the requirements of satellite interceptor systems make the use of sea basing combined with air-launching most attractive. Additional study is indicated to more properly ascertain the framework in which a Naval application can function.

## RECOMMENDATION

It is strongly recommended that a study program be expeditiously undertaken to examine in greater detail the basic systems outlined herein. The additional work is absolutely essential to establish, with a high level of technical confidence, the feasibility of the weapon system to support future planning or programming. Prompt action is predicated by the need to keep abreast of the development of the systems to be countered. The consequence of delay is significantly indicated by the status of the current anti-ICBM effort, now barely underway, whereas its target objective, the ICBM, is practically operational.

DISCUSSION

The development of an anti-satellite weapon system presents itself as a most formidable problem fraught with technical complexities of the highest degree. Current studies (funded and unfunded) by leading industry and government agencies arrive at several conclusions common to the basic anti-satellite concept, independant of the detailed nature in which the particular study was conducted, namely:

(a) It is highly unlikely that a point intercept can be accomplished. By point intercept is meant the destruction of a satellite the first time it appears over defended territory. Present and near future estimates of satellite tracking capabilities strongly preclude attainment of accuracies necessary to perform the above mission. Current thinking suggests that at least four to five passes of the satellite are required to establish its position and velocity with sufficient accuracy to permit interception techniques to operate.

(b) It is highly desirable if not mandatory that the trajectory of the interceptor missile be in as close a co-orbital plane with the satellite as accuracy permits in general, and during the terminal phase in particular, to minimize closing rates, velocities, and intercept kinematics. The consequences of off-orbital launching are larger missile systems, more difficult mid-course guidance, and possibly more complicated terminal navigation.

Consideration of these important factors leads to the logical deduction that a mobile launching system would be advantageous to implement the co-orbital launch and intercept. In fact this has been suggested by several investigators including the author. To affect complete flexibility of operation it seems obvious that a ship-based system tied in with an airlaunched weapon would be the ultimate in mobility. For nominal orbital periods of two hours, the time to complete four passes would be eight hours. In this time period, an airplane cruising at even 350 knots would cover 2,800 n. miles, whereas a ship detection or tracking station, if necessary, could move a distance of 160 n. miles when cruising at 20 knots. It is with this concept in mind that a brief study was made of a carrier-based aircraft system launching a satellite interceptor missile. It appears that a vehicle weight of about 6,000 pounds would be required to boost a 200 pound interceptor to nominal satellite altitudes, when launched from a carrier-based airplane at M = 0.8 and 35,000 feet altitude. The terminal phase could consist of a lead navigation mode, a velocity-control motor unit, and a 100 pound payload. The overall dimensions are about 27 feet long by 2 feet in diameter.

Consideration was also taken of a two-manned-stage system and a final interceptor missile stage to achieve satellite velocity. The system was comprised of the following components: -

(a) The P6M-2 as a first stage recoverable booster.

(b) An X-15 type airplane (possibly a modified F8U-3) as a top mounted second stage recoverable booster

(c) A 1,000 pound gross weight interceptor missile to carry a 100 pound warhead to orbital speeds and altitudes.

The P6M with its nominal operating radius of 600 n. miles can carry a 30,000 pound payload at M = 0.7 and 40,000 feet altitude. The second stage, when released from the P6M, could attain an altitude of about 240,000 feet and a velocity at this altitude of about 6,000 ft/sec.

The missile would be correspondingly smaller, in the order of 13 feet long and 1.3 feet in diameter, than the carrier-based weapon.

It appears therefore that the use of sea basing may prove to be highly desirable in satellite interceptor application. However, the need for additional detailed study is plainly indicated to establish the Naval features of the system.

[ This page is intentionally left blank. ]

[ This page is intentionally left blank. ]