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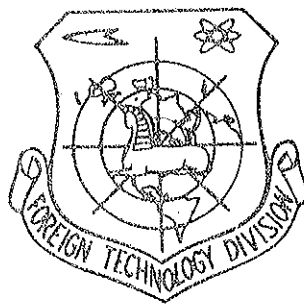
FOREIGN TECHNOLOGY DIVISION

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FUZE EXPLOITATION (U)

Foreign Materiel Exploitation



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EXPLOITATION PLAN FOR THE ATOLL FUZE (S/NFD)

Prepared by:
Lt E. F. Matthews
Robert E. Frick

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This Page is Unclassified

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SECRET**NO FOREIGN DISSEM****I Background Data**

A. (S/NFD) An IR Optical Proximity Fuze (herein after known as the Special Fuze) from the Soviet AA-2 (ATOLL) air-to-air missile was sent to the Naval Ordnance Laboratory, Corona (NOLC) for test and evaluation during the summer of 1966. A report entitled "Technical Analysis of Special Fuze and Comparison with MK 303 Fuze (U)" was generated and published by NOLC. The report number is OOT-325/14579-66. This report presents a detailed component analysis of the Special Fuze and a description of the operation of the major fuze subassemblies. Extensive photographic coverage is present throughout the report. The report does not cover any field testing of the special Fuze regarding its operational performance in a simulated mission environment nor does it include any analysis of the fuze susceptibility to IRCM systems. The report does allow certain basic operational characteristics to be derived from the bench-type measurements which were made. However, the lack of field measurement data, fuze susceptibility to flare IRCM data, and other specific component analysis, requires that additional exploitation be accomplished. The present exploitation program will meet these additional requirements.

B. The Air Proving Ground Center, (Eglin AFB), Missile Electronic Warfare Technical Area (MEWTA), USAECOM, at White Sands Missile Range, N. Mexico and the Air Force Avionics Lab at Wright-Patterson will be the exploiting units in this program. The initial test period will commence with the receipt of the fuze by APGC and will terminate 45 days thereafter. During the initial 45 days of the plan ground based testing will be performed.

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C. Phase 2 will start at MEWTA and will revolve around the vulnerability of the special fuze to Army IRCM techniques as related to Army Requirements. This second phase will involve 90 days of testing before shipment back to APGC for final field testing in an operational environment. Ninety days will be required for Phase 3 before shipment to AFAL which will be prime on the component analysis of the fuze.

D. (S/NFD) The Special Fuze was received at FTD during the first week in October 1966. During the third week in October, the fuze was handcarried to the Harry Diamond Laboratories (HDL), Washington, D.C. for purposes of rebuilding and modifying for further testing. In early April 1967, HDL delivered the fuze to FTD along with additional measurement data and comments regarding the fuze condition. During the time the Special Fuze was acquired at FTD and rebuilt and further analyzed by HDL, the Intelligence community was surveyed for requirements regarding the fuze exploitation.

E. (S/NFD) The present fuze status is as follows:

1. The Special Fuze has been rebuilt and modified for operational test and analysis. A special plug has been mounted on the fuze for video and bias connections.

2. The Safety-Arming (S-A) Device has been removed from the fuze. This device is considered to be still armed. The S-A Device will not be required for operational testing of the fuze.

3. Three of the eight original Lead Sulphide (PbS) detectors in the fuze have been replaced with U.S. detectors.

4. As modified by the above comments the Special Fuze has been

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rebuilt to its original condition.

II Master Schedule

A. (U) Receipt of Item

During the summer of 1966 this item was sent to the Naval Ordnance Laboratory, Corona (NOLC) for a detailed technical analysis. Information on the analysis performed by NOLC and the events associated with the item between the summer of 1966 and the present are contained in Section A, Background Data.

B. (C) Markings Data Coverage

Each agency involved in the exploitation and testing of the Special Fuze will insure that 35mm photos (black and white) are taken throughout the exploitation of their respective portions of the test. This will include photography on all trade designations and stampings. All markings coverage will be performed before any damage is done to the components of the fuze.

Markings photos will be sent unprocessed to TDAOS for distribution to the Joint Markings Committee, DIA/CIA as soon as they are available. Information derived from the photos will be requested from the agency for inclusion into the final report.

C. (S/NFD) Photographic Coverage

The photographic coverage performed by NOLC on the components and subunits associated with the entire fuze assembly is deemed to be sufficient in nature. However, adequate photographic coverage of the operational testing of the fuze will need to be provided. During Phases 1, 2 and 3, both APGC and WSMR will provide photographic coverage of the test apparatus and instrumentation associated with the ground based

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and field testing. It is not anticipated that photographic coverage will be required during Phase 4.

D. (S/NFD) Initial Evaluation

The initial evaluation of this item has been primarily accomplished by the Naval Ordnance Laboratory, Corona, (NOLC). Additional analysis has also been performed by the Harry Diamond Laboratories (HDL) in Washington, D.C. All analysis on the Special Fuze prior to the present exploitation has been on components and basic operating parameters. No field measurements have been made on the fuze regarding its operational performance and IRCM susceptibility.

E. (S/NFD) Systems and Laboratory Analysis

1. The operational testing of the Special Fuze will be performed in three different phases. Phases 1 and 2 will involve ground-based testing of the fuze while Phase 3 will involve field testing. After the operational tests have been completed the component testing, designated as Phase 4, will begin.

2. A brief description of the 4 phases is presented in the following paragraphs. The responsible agency and the time allotted to each agency for that particular phase of testing, is designated. A more detailed account of each phase follows these brief descriptions.

a. Phase 1 - This phase will constitute the initial ground-based testing of the Special Fuze and will be accomplished at Eglin AFB (APGC). The period of time at APGC for this phase will be 45 days. The responsible program manager at APGC will be Mr. Dave Edwards/PGLPR. The responsible project engineer at APGC will be James Bayse/PGVPEP-1.

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b. Phase 2 - This phase will involve analyzing the Special Fuze vulnerability to various Army IRCM techniques and for general operational testing as related to Army requirements. This phase will be performed at MEWTA, USAECOM (WSMR) for a time period of 90 days. The responsible program manager at MEWTA will be Mr. D. DeMoulin/AMSEL-WL/MP. The responsible project engineer will be Mr. Sam Megeath/AMSEL-WL/MB.

c. Phase 3 - This phase will constitute the field testing of the Special Fuze and will be performed by APGC. The period of time at APGC for this phase will be 90 days. The responsible program manager and project engineer will be as designated in Phase 1.

d. Phase 4 - This phase will constitute the component analysis required on the Special Fuze sensors and miniature tubes. The performing agency will be the Air Force Avionics Laboratory (AVRO). The time at AVRO will be 60 days. The program manager will be Mr. C.L. Woodard and the project engineer will be Mr. T.D. Pickenpaugh.

3. The following paragraphs present a more detailed description of each phase briefly discussed above. Comments regarding the break between Operational Testing (Phases 1 through 3) and Component Testing (Phase 4) are also discussed.

a. Phase 1 - The Special Fuze will be sent to APGC on approximately 7 July 1967 for the initiation of ground-based testing. The period of time at APGC will be 45 days. APGC will make sufficient initial measurements on the Special Fuze to insure it is in proper operating condition and to insure that the necessary back up data for future data reduction is available. Once sufficient measurements have

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been made to provide minimum support data for analysis of operational data, the ground-based testing will begin. Initially APGC will determine the basic operational performance of the fuze during what will be designated as Phase 1A. During Phase 1B, APGC will determine the fuze susceptibility to IRCM techniques (i.e., flares). The following minimum test variables will be provided for both Phase 1A and Phase 1B of the ground-based testing:

- (1) Fuze (missile) to target distance to detonate fuze (termed activation distance).
- (2) Target radiant intensity.
- (3) Target closure rate through Channel 1 and Channel 2 fuze FOV.
- (4) Variation in aspect angle of attack between target and missile (fuze) in terms of elevation and/or azimuth angle. Using these variables or test parameters sufficient testing shall be performed to allow determination of the following:
 - (a) The target closure rate required to detonate the fuze as a function of activation distance, intensity and attack aspect.
 - (b) The activation distance as a function of target intensity, closure rate and attack aspect.
 - (c) Minimum target radiant intensity to detonate fuze as a function of activation distance, closure rate and attack aspect.

In each of the preceding measurements, it should be determined if detonation occurred. Besides the ground-based testing

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described above, APGC will have the responsibility for making the following additional measurements or analysis:

(d) An analysis of the optical assembly in terms of aperture size, focal length, etc. A drawing showing the ray trace of the optics shall be made.

(e) A comparison of the Channel 1 and Channel 2 spectral filters in the Special Fuze versus the Mk 303 (Sidewinder) Fuze. The difference in spectral coverage should be analyzed in terms of false target detection, target/background discrimination and other parameters which point out the advantage/disadvantage of either system.

After Phase 1 is completed, APGC will pack and ship the Special Fuze to MEWTA, USAECOM (WSMR) for the start of Phase 2 testing.

b. Phase 2 - The Special Fuze will be sent to MEWTA, USAECOM (WSMR) for a period of 90 days for additional ground-based testing. This phase will involve the analysis of the Special Fuze vulnerability to Army jamming and CM techniques where the fuze (missile) would be employed in a surface-to-air mode. The first three weeks of Phase 2 will be utilized to obtain familiarity with the Special Fuze and to construct any special test equipment required in the vulnerability tests. The fuze susceptibility to being decoyed by the following techniques will be measured:

- (1) Confusion
- (2) Deception
- (3) Modulation
- (4) Position Variation

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(5) RF Effects

After Phase 2 is completed the Special Fuze will be packed and shipped by MEWTA to APGC for the start of Phase 3 Operational Testing.

c. Phase 3 - This phase will constitute the field test and analysis of the Special Fuze. APGC will have prime responsibility for the field testing and the time on site at APGC during this phase will be 90 days. The measurements obtained during this phase will provide the following data:

(1) The IRCM susceptibility of the Special Fuze to a flare environment. This data will be used to validate the ground-based data obtained under Phase 1.

(2) An indication of fuze detonation under the various IRCM techniques used in the previous paragraph.

4. At the end of Phase 3 a meeting will be held to determine any additional requirements which interested agencies may have concerning operational analysis of the Special Fuze. If no further requirements are levied, the Special Fuze will be shipped by APGC to FTD for the beginning of Phase 4. At this point, the operational testing of the Special Fuze will be considered terminated.

a. Phase 4 - This phase will involve component testing of the Special Fuze. The Air Force Avionics Laboratory (AFAL) will provide prime support during this phase, and the time at AFAL will be 60 days. The AFAL (AVRO) will perform the following analysis on the Special Fuze Target Detection Device (TDD):

(1) Determine absolute measurements of D^* (, f, f) and D^* (500°K, f, f) for each detector (8 measurements) in the Special

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Fuze.

- (2) Compare responsivity (volts/watt) of each detector with the preamplified input noise.
- (3) Measure signal, noise and signal/noise ratio as a function of bias voltage for each detector.
- (4) Compare the uniformity of characteristics for each detector.
- (5) Perform a chemical analysis and contour sensitivity analysis on one or more detectors.
- (6) Perform an analysis on the IR window material in terms of material homogeneity, possible surface coatings, chemical stability, resistance to aging, etc.
- (7) Perform an analysis on the miniature tubes used in the Special Fuze.

5. At the end of Phase 4, a meeting will be held to decide if any additional component analysis is required on the Special Fuze by interested agencies. If no additional requirements are imposed, the fuze will be turned over to FTD for storage until further notice.

F. Reporting

Each agency, as designated in Phases 1 through 4, will have the responsibility of submitting a final report summarizing the exploitation accomplished during each Phase. Thus, Eglin (APGC) will be required to submit a final report on Phases 1 and 3, MEWTA will submit a final report on Phase 2, and AFAL (AVRO) on Phase 4. Depending on the degree of analysis, the reports will be due at FTD 30-60 days following each phase. Each report will adequately describe test



National Security Archive,
Suite 701, Gelman Library, The George Washington University,
2130 H Street, NW, Washington, D.C., 20037,
Phone: 202/994-7000, Fax: 202/994-7005, nsarchiv@gwu.edu