

INCH-POUND
 MIL-C-23933B(NAVY)
 23 August 1993
 SUPERSEDING
 MIL-C-23933A(AS)
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MILITARY SPECIFICATION

CARTRIDGE, IMPULSE, MARK 44 MOD 0

This specification is approved for use by the Department of the Navy and is available for use by all Departments and Agencies of the Department of the Department of Defense

1. SCOPE

1.1 Scope. This specification covers the manufacture, assembly and preparation for delivery of the Cartridge, Impulse, Mark 44 MOD 0.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

MILITARY

MIL-P-116 Preservation, Methods of

MIL-D-21625 Design and Evaluation of Cartridges for Cartridge Actuated Devices

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Warfare Center Aircraft Division Lakehurst, Systems Requirements Department, Code SR3, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 1377

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-414	Sampling Procedures and Tables for Inspection by Variables for Percent Defective
MIL-STD-453	Inspection, Radiographic
DOD-STD-2101	Classification of Characteristics

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from DODSSP - Customer Service, Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those cited in the solicitation.

DRAWINGS

NAVAL AIR SYSTEMS COMMAND (CAGE Code 30003)

LD 537925	Cartridge, Impulse, Mark 44 MOD 0
LD 537927	Container, Inner, for Cartridges
LD 537928	Container, Outer, for Cartridges
DL 2519737	Test Set, Closed Bomb (For Cartridge, Mark 44 and 45)
2240764	Body and Bridgewire Assembly
2240772	Cartridge, Impulse, Mark 44 MOD 0, Assembly
2406487	Primer Mix No. 487

(Application for copies should be addressed to the Commanding Officer, Naval Air Technical Services Facility (Code 3121), 700 Robbins Avenue, Philadelphia, PA 19111.)

PUBLICATIONS

CODE OF FEDERAL REGULATIONS (CFR)

49 CFR 100-199 Transportation

(Copies of CFRs are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

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NAVAL SEA SYSTEMS COMMAND (CAGE Code 53711)

OP 5

Ammunition and Explosives Ashore

(Application for copies should be addressed to the Aviation Supply Office, Naval Publications and Forms Directorate, Attn: 1053, Building 26, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.4.

3.2 Conformance to documents. The impulse cartridge MK 44 MOD 0 covered by this specification shall be manufactured in accordance with the drawings listed on LD 537925 and all documents listed thereon.

3.3 Materials. All materials used in the manufacture of the cartridges shall conform strictly to the specifications referenced on the respective Naval Air Systems Command drawings unless specific approval in writing covering a departure therefrom has been obtained from the cognizant Navy design activity prior to manufacture. When alternate materials or methods of manufacture are specified on the drawings, the bidder's selection shall be clearly stated in the proposal.

3.4 Primary components. For the purposes of this specification, the primer mix, Drawing 2406487, and the propellant charge, are considered primary components (see 4.5.2).

3.5 Insulation resistance. Prior to welding the bridgewires to the pins, the insulation resistance between the metal parts of the assemblies shall be a minimum of 50 megohms at a relative humidity of 80 percent or less when measured as specified in 4.6.1.

3.6 Primer mix. The primer mix shall be compounded and loaded in accordance with Drawings 2406487 and 2240772, respectively.

3.7 Propellant charges.

3.7.1 Quantity. All propellant charges shall be as specified on Drawing 2240772. Charges shall be determined by weight rather than by volume measurements.

3.7.2 Smokeless powder, handling, and loading. The smokeless powder shall be subjected to no unnecessary handling or exposure to the atmosphere. The handling and loading of smokeless powder exposed to the atmosphere shall be performed only under conditions that do not permit the relative humidity to exceed 75 percent.

3.7.3 Smokeless powder, condition. There shall be no evidence of decomposition of the smokeless powder utilized (see 4.6.2).

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3.8 Cartridge.

3.8.1 Bridge circuit resistance. The resistance of each of the two bridge circuits in each completely assembled cartridge, when measured electrically as specified in 4.6.1, shall be not less than 0.25 ohm nor more than 0.35 ohm.

3.8.2 Leakage. Cartridge leakage rate shall not exceed 1×10^{-5} cubic centimeter (cm^3) of air or gas per second when tested in accordance with 4.6.5.

3.8.3 Radiographic examination. Cartridges shall be free of imperfections when examined radiographically (see 4.6.6).

3.9 Ballistic requirements. Cartridges shall meet the requirements of 3.9.1 through 3.9.3 when subjected to the test prescribed in 4.6.7.

3.9.1 Maximum pressure. The upper (U) and lower (L) limits of maximum pressure, in pounds per square inch (psi) shall be 1700 and 1050, respectively.

3.9.2 Misfire. There shall be no misfires (see 4.6.7.1.2).

3.9.3 Hangfire. There shall be no hangfires (see 4.6.7.1.3).

3.9.4 Change in propellant lot. Whenever a change occurs in the propellant lot, test firings shall be conducted in accordance with 4.7.

3.10 Workmanship. Cartridges shall be free of the following visible defects: burrs, incomplete threads, perforated closure disc, incomplete or improper soldering of closure disc, bent pins, damaged "O" ring; or any other imperfections which could prevent assembly with the device in which the cartridge is to be used or adversely affect performance or resistance to moisture (see 4.6.3). Cartridges shall be constructed and finished in a manner to ensure compliance with all requirements of this specification. Particular attention shall be directed to the dimensions, finishes, and coatings.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5).

4.3 Classification of characteristics. The characteristics verified by the tests and examinations herein are classified as critical, major, and minor in accordance with DOD-STD-2101. Tests and examinations that verify critical characteristics are identified by the symbol (C) and major characteristics by the symbol (M). The number following the classification symbol indicates the serial number of test or examination. Tests and examinations which are not annotated with a classification code are classified minor.

4.4 First article inspection. Before entering into quantity production, an acceptable first article sample of 70 cartridges shall be prepared. Of these cartridges, 60 shall be expended in the tests listed below and 10 shall be retained for investigative purposes. A first article sample acceptable for environmental and functional testing shall be a sample which has met the requirements of 3.3 through 3.8.3 of this specification. First article sample acceptance shall consist of the following tests as prescribed in MIL-D-21625: 15 "g" shock (6 samples); vibration (6 samples); temperature and humidity cycling (12 samples); and untreated (12 samples). These cartridges, after exposure to the specified environmental treatments, shall be conditioned for a minimum of 6 hours at $+70 \pm 5$ degrees Fahrenheit ($^{\circ}\text{F}$) and fired in the test of 4.6.7. In addition, 24 cartridges shall be temperature conditioned for a minimum of six hours; 12 cartridges at $-65 \pm 5^{\circ}\text{F}$, and 12 cartridges at $+160 \pm 5^{\circ}\text{F}$, and fired in the test of 4.6.7. All cartridges shall fire and produce results within the limits set forth in paragraphs 3.9.1 and 3.9.3. The failure of any cartridge to meet the acceptance requirements stated above shall be cause for rejection of the first article sample.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of verification of the characteristics classified on the drawings of LD 537925 and performance of the tests specified in Table I.

TABLE I. Quality conformance inspection.

Item	Nature of test	Require- ment	Test	Classification (DOD-STD-2101)
Primary component	Single lot	3.4	4.5.2	(M101)
Body and bridgewire assemblies (incomplete)	Insulation resistance	3.5	4.6.1	(M102)
Primer mix	Compounding	3.6	4.6.3	(M103)
Primer mix	Loading	3.6	4.6.3	(C1)
Propellant charge	Type and weight	3.7.1	4.6.3	(C2)
Smokeless powder	Condition	3.7.3	4.6.2	(C3)
Cartridge	Visual inspection	3.10	4.6.3	(M104)
Cartridge	Bridge circuit resistance	3.8.1	4.6.4	(C4)
Cartridge	Leakage	3.8.2	4.6.5	(C5)
Cartridge	Radiographic examination	3.8.3	4.6.6	(C6)

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TABLE I. Quality conformance inspection - Continued.

Item	Nature of test	Requirement	Test	Classification (DOD-STD-2101)
Cartridge	Ballistic test	3.9	4.6.7	(C7)
Cartridge	Ballistics (change in propellant lot)	3.9.4	4.7	(C8)
Cartridge	Packaging, packing, and container marking	Section 5	4.8	(M105)

4.5.1 Sampling. Unless otherwise specified, and when applicable, the sampling plans and procedures used in the determination of the acceptability of products submitted by a contractor shall be in accordance with the provisions of MIL-STD-105.

4.5.2 Inspection lots. Inspection lot definition, formation, and size shall be in accordance with MIL-STD-105, Table I, General Inspection Level II, or MIL-STD-414 whichever applies. Unless otherwise specified in the contract or purchase order (see 6.2), the minimum and maximum production lot size shall be 301 and 1300 cartridges, respectively. Only primary components from a single lot shall be used in a production lot of cartridges; however, one primary component production lot may be used in more than one cartridge production lot.

4.6 Tests.

4.6.1 Insulation resistance. Prior to welding the bridgewires to the pins, to complete body and bridgewire assemblies (Drawing 2240764), the insulation resistance between the pins and between the pins and the cartridge body shall be checked with an applied voltage of 500 ± 25 volts direct current. Units which fail to meet the requirements of 3.5 shall be rejected.

4.6.2 Smokeless powder, condition. Smokeless powder shall be inspected in accordance with the applicable paragraphs of OP 5. Evidence of decomposition shall be cause for rejection.

4.6.3 Visual inspection. The primer mix shall be visually inspected during compounding and loading for conformance to 3.6. The charge quantity shall be measured for conformance to 3.7.1. All cartridges shall be visually examined and those having any of the defects of 3.10 shall be rejected.

4.6.4 Bridge circuit resistance. Conformance with the bridge circuit resistance of 3.8.1 shall be ascertained by means of a test circuit which limits the bridge current to 25 milliamperes, maximum. The test circuit shall be connected to the cartridge through a fully assembled electrical connector, Bendix PC06E-8-4S or equal. A new connector shall be used after a maximum of 500 connections. A safety chamber with an interlock switch shall be used to protect the operator during the application of current. A suitable bridge which is known to be accurate within one percent, in the range of resistance specified, shall be used to determine whether or not the requirement is being met. Units which fail to meet the requirements of 3.8.1 or fail to assemble completely, by hand, with the specified connector shall be rejected. The results of bridge circuit resistance measurements shall not be affected by resistance of the test circuit and connector.

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4.6.5 Leakage. Each cartridge in the first article sample or production lot ballistic sample shall be leak tested in a dry gas or dry air leak tester. Cartridges which exhibit a leak rate in excess of 1×10^{-5} cm³ per second of air or gas at a pressure differential of 1.0 ± 0.1 atmosphere shall be considered defective. Cartridges of the first article sample which exhibit a leakage defect shall be rejected. If one or more cartridges of the production lot sample exhibit a leakage defect, then a 100 percent leak test of the lot being tested shall be required at no additional expense to the Government. Cartridges which exhibit a leak rate in excess of that specified above shall be rejected.

4.6.6 Radiographic examination. All cartridges shall be radiographically examined in accordance with MIL-STD-453. Cartridges having any observable imperfections in assembly shall be cause for rejection. The cartridges shall be positioned on their sides for the most revealing exposure. All cartridges shall be identified with serial numbers prior to examination. The cartridge serial numbers shall be in consecutive order beginning with the number 001 in each production lot. The cartridges shall be arranged on trays or boards in consecutive numerical order, and each radiograph shall carry a permanent identification of the cartridges displayed thereon. The radiograph identification shall include the complete lot number, as stamped on the cartridges, and the span of serial numbers displayed. Discontinuities in serial numbers shall be identified on the X-ray. Defective cartridges found by the vendor shall be clearly identified on the X-ray and those defectives removed from the production lot.

4.6.7 Ballistic tests. The number of cartridges selected from each production lot for the ballistic tests shall be in accordance with Table A2 of MIL-STD-414, Inspection Level IV and an acceptable quality level (AQL) of 0.10. The cartridges shall be conditioned for a minimum of 6 hours at $+70 \pm 5^\circ\text{F}$ and fired in a test set manufactured in accordance with the drawings listed on DL 2519737. Suitable instrumentation shall be used for each firing to record pressure versus time and the elapsed time between actuation of the firing mechanism and the start of pressure rise. The firing current shall be 5 ± 0.10 amperes for each bridge circuit. Results shall be recorded (see 6.2 and 6.3). In addition to the sample cartridges for the above test, 10 additional cartridges shall be furnished from each production lot for investigative purposes.

4.6.7.1 Criteria of acceptability.

4.6.7.1.1 Chamber pressure. The chamber pressure shall meet the requirements of 3.9.1. Lot acceptability shall be determined in accordance with the applicable provisions of MIL-STD-414 at an AQL of 0.10.

4.6.7.1.2 Misfire. The failure of any cartridge to fire shall result in rejection of the lot represented, unless such failure is plainly attributable to faulty test equipment or procedure.

4.6.7.1.3 Hangfire. One or more hangfires shall result in rejection of the lot represented (see 6.5.1).

4.6.8 Retest. There shall be no retests. If test failure is attributable to an assignable cause, excluding the test cartridges, original test results should be discarded and that part of the test reconducted.

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4.7 Change in propellant lot. Whenever a change in propellant lot occurs, validity of the charge determination shall be verified by firing 36 cartridges which have been temperature conditioned for a minimum of six hours as follows: 12 cartridges at $-65 \pm 5^{\circ}\text{F}$, 12 cartridges at $+70 \pm 5^{\circ}\text{F}$, and 12 cartridges at $+160 \pm 5^{\circ}\text{F}$. Results of these firings shall fall within the limits prescribed in 3.9.

4.8 Inspection of preservation, packing, and marking. The preservation, packing, and marking shall be inspected in accordance with the inspection criteria on the applicable drawings referenced in section 5.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or C as specified (see 6.2 and 6.5).

5.1.1 Level A. Level A preservation shall be used for all production lots for service use. Four cartridges shall be preserved in an inner container in accordance with the drawings of LD 537927.

5.1.2 Level C. When directed by the contracting activity, those cartridges which are intended for expenditure in first article sample testing and for production lot acceptance tests shall be preserved in accordance with Method III of MIL-P-116 and 49 CFR 171-178.

5.2 Packing. Packing shall be level A or C, as specified (see 6.2 and 6.5).

5.2.1 Level A. Level A packing shall be used for packing of all production lots for service use. Twelve inner containers, preserved as described in 5.1.1, shall be packed in accordance with the drawings of LD 537928.

5.2.2 Level C. When directed by the contracting activity, cartridges intended for expenditure in first article sample testing and for production lot acceptance tests, preserved as described in 5.1.2, shall be packed to afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use. Shipping containers shall be in accordance with 49 CFR 171-178.

5.3 Marking.

5.3.1 Special marking. In addition to any special marking required by the contract or order (see 6.2), marking of exterior containers shall be in accordance with 49 CFR 171-178.

5.3.2 Normal marking. Unless otherwise specified in the contract or order (see 6.2), the marking information on unit packs and shipping containers shall be as specified on the drawings listed on LD 537927 and LD 537928 respectively. The specified marking information shall be applied to the containers in accordance with the applicable provisions of MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful but is not mandatory).

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6.1 Intended use. The Mark 44 MOD 0 impulse cartridge is intended for use in operating the latchpin in the destruct mechanism of the XKD-2B target drone.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).
- c. Whether a first article sample is required (see 3.1, 4.4, and 6.4).
- d. Activity to receive ballistic tests reports (see 4.6.7 and 6.6).
- e. Test activity and production lot size if other than as specified (see 4.1 and 4.5.2).
- f. Level of preservation and packing required (see 5.1 and 5.2).
- g. Whether special marking is required (see 5.3).
- h. That the safety precaution requirements of the "Contractor's Safety Manual for Ammunition, Explosives and Related Dangerous Material" (DOD 4145.26M) are applicable and should be specified in the contract as required by the Federal Acquisition Regulation (FAR) 23.3. NOTE: When this document is used as part of the description of work to be accomplished by a Government activity, the safety precaution requirements of "Ammunition and Explosives Ashore" (OP 5) should be made applicable.

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DIDs) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DIDs are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 227.405-70 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.6.7	DI-NDTI-80809A	Test/inspection reports	---
4.1.1	DI-NDTI-80809A	Test/inspection reports	10.2.7, only

The above DIDs were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

6.4 First article. When a first article sample is required, the contracting officer should provide specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and

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disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.5 Definitions. For the purpose of this specification, the following definitions apply:

6.5.1 Hangfire. A hangfire is a firing in which the elapsed time between actuation of the firing mechanism and start of pressure rise exceed 0.075 second.

6.5.2 Level A preservation. The degree of preservation which will afford adequate protection against corrosion, deterioration, and physical damage during handling, shipment, indeterminate storage, and world-wide redistribution.

6.5.3 Level C preservation. The degree of preservation which will afford adequate protection against corrosion, deterioration, and physical damage during shipment from supply source to the first receiving activity for immediate use. This level may conform to the contractor's commercial practice when such meets the requirements of this specification.

6.5.4 Level A packing. The degree of packing which will afford adequate protection during shipment, handling, indeterminate storage, and world-wide redistribution.

6.5.5 Level C packing. The degree of packing which will afford protection against damage during direct domestic shipment from the supply source to the first receiving activity for immediate use. This level in general will conform to the applicable carrier rules and regulations and may be the contractor's commercial practice when such meets the requirements of this level.

6.6 Test reports. The contract or purchase order should specify that results of ballistic tests are to be forwarded to the Naval Air Systems Command (AIR-5403) and the contracting activity.

6.7 Subject term (key word) listing.

Ordnance
Propellant charge
Smokeless powder
Target drone

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Navy - AS

Preparing activity:
Navy - AS

Review activity:
Navy - OS

(Project 1377-NE44)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-C-23933B(NAVY)	93/8/23

3. DOCUMENT TITLE
CARTRIDGE, IMPULSE, MARK 44 MOD 0

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code)	7. DATE SUBMITTED (YYMMDD)
	(1) Commercial	
	(2) AUTOVON	
	(If applicable)	

8. PREPARING ACTIVITY

a. NAME COMMANDING OFFICER, NAVAL AIR
WARFARE CENTER AIRCRAFT DIVISION LAKEHURST
SYSTEMS REQUIREMENTS DEPARTMENT

b. TELEPHONE (Include Area Code)
(1) Commercial (2) AUTOVON
(908) 323-7488 624-7488

c. ADDRESS (Include Zip Code)
CODE SR3
LAKEHURST, NJ 08733-5100

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340