

INCH-POUND
 MIL-C-57780
 8 May 1992
 SUPERSEDING
 MIL-C-5778C
 22 June 1973

MILITARY SPECIFICATION

COVERS, AIRCRAFT COMPONENTS, GENERAL REQUIREMENTS FOR

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

1. SCOPE.

1. Scope. This specification covers general requirements for covers intended to protect the following aircraft parts:

Cockpit	Fuselage	Canopy
Engine	Armament	
Propeller or Rotor	Miscellaneous	

1.2 Classification. Covers shall be of the following types, as specified (see 6.2):

Type I - Waterproof Fabric Material (see 3.3.1.1)

Type II - Coated Material (see 3.3.1.2)

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications and standards. The following specifications and standards 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).

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 (SRD) (Code SR3), Lakehurst, NJ 08733-5100, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 1730

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SPECIFICATIONSFEDERAL

T-T-881	Twine, Cotton, Seine
V-F-106	Fastener, Slide, Interlocking
CCC-C-41 9	Cloth, Duck, Cotton, Unbleached, Plied-Yarns (Army and Numbered)
CCC-D-950	Dyeing and Aftertreating Processes for Cotton Cloths
PPP-B-601	Box, Hood, Cleated-Plywood
PPP-B-636	Box, Shipping Fiberboard

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MIL-P-116	Preservation, Methods of
MIL-W-5665	Webbing, Textile, Cotton Warp
MIL-C-10799	Cloth, Coated Cotton, Vinyl Coated, Fire and Mildew Resistant
MIL-R-17343	Rope, Nylon
MIL-C-20696	Cloth, Coated, Polyester or Goop, Synthetic, Nylon, Waterproof
MIL-F-21840	Fastener Tapes, Hook and Loop Synthetic
MIL-M-46C32	Fungus Resistant Treatment for Sandbags: Cooper Processes

STANDARDSFEDERAL

FEK)-STD-595	- Colors
FED-STD-751	- Stitches, Seams and Stitching

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MIL-STD-100	- Engineering Drawing Practices
MIL-STD-129	- Marking for Shipment and Storage
MIL-STD-130	- Identification Marking of U S. Military Property
MIL-STD-147	- Palletized Unit Loads
MIL-STD-831	- Test Reports, Preparation of
MIL-STD-2073-1	- DoD Material Procedures for Development and Application of Packaging Requirements
MS20230	- Grommet, Metallic, Plain and Spur, With Washer, Type I and Type III
MS51700	- Streamer, Warning

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

* 2 1.2 Other Government documents, drawings, and publications. The following other Government documents, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

Commercial Item Description

A-A-52094	- Thread, Cotton
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(Unless otherwise indicated, copies of commercial item descriptions are available from: Standardization Documents Order Desk Bldg. 4D, 700 Robbins Avenue Philadelphia, PA 19111-5094)

* 2.2 Non-Government publication. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the Issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

American Society for Testing and Materials (ASTM)

ASTM D 3951 Standard Practice for Commercial Packaging

(Application for copies of this ASTM should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1183).

* 2.3 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 6.4), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.4.

3.2 General. In addition to the requirements herein, the requirements specified on the drawings for covers for the particular model of aircraft shall also apply.

3.3 Materials. Materials shall be as specified herein. Where materials are not specifically designated, they shall be designed or selected to be suitable for the purpose.

3.3.1. Fabric Material.

* 3.3.1.1 TPYE I. Unless otherwise specified, Type I materials shall be as specified in 3.3. 1.1.1 thru 3.3.1.1.4.

* 3.3. 1.1.1 Transparent plastic canopies. Material conforming to MIL-C-10799 shall be used in the covers for transparent plastic canopies such as the bombardier and pilot compartments, nose section, turrets and sight blisters.

* 3.3.1.1.2 Engine covers. Material for engine covers shall conform to MIL-C-10799, type II, class 4.

* 3.3. 1.1.3 Warning streamers. Naming streamers, when specified (see 6.2), shall be in accordance with MS51700-12. The streamers shall be long enough to permit at least a 12 inch length exposure when the cover is installed on the aircraft.

* 3.3.1.1.4 All other covers. For covers not specified in 3.3.1.1.1 thru 3.3.1.1.3, the material shall conform to CCC-C-419, type III, 12.29 ounces per square yard. The material shall be finished in accordance with CCC-D-950, type I, class B.

3.3.1.2 Type II Unless otherwise specified (see 6.2), the material for type II covers shall conform to MIL-C-20696, type I, class 2. Warning streamers shall be the same as for type I.

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* 3.3.2 Thread. Unless otherwise specified, all thread used for sewing shall be in accordance with A-A-52094, ticket No. 16, 4 ply, type II, and shall be the same color as the cover material.

3.3.3 Metal fittings. Grommets, eyelets, and fasteners shall conform to the applicable service use.

3.3.4 Webbing (type I). Unless otherwise specified, the webbing used for attaching the covers and for all binding and reinforcement shall conform to MIL-H-5665, and shall be the same color as the cover material.

3.3.5 Tie cord. Unless otherwise specified, the tie cord used for attaching covers and holding them in place shall be 1/4 inch rope conforming to MIL-R-17343.

3.3.6 Twine. Unless otherwise specified, the twine used for wrapping ends of the tie cords shall conform to T-T-881.

3.3.7 Mildew proofing. The cotton thread, webbing, and ropes used in engine covers shall be treated in accordance with MIL-M-46032, type I organic solvent dispersion method, except the permissible weight increase shall be 15 percent maximum and the metallic copper content shall be 0.3 ± 0.1 percent by weight.

* 3.3.8 Interlocking fasteners (type 1). Except as otherwise specified herein, interlocking slide fasteners shall conform to V-F-106, type IV, style No. 1 or 3, class B, size H, wire-stirrup pull, metal-zinc alloy with natural finish, color 613 of FED-STD-595. An 18 + 1/2 inch fabric thong shall be looped through the wire-stirrup pull and shall be capable of withstanding a tension pull of at least 100 pounds.

3.4 Design and construction The covers shall be so designed that when installed they will fit neatly and completely cover the part of the aircraft for which they are intended. The edges of the covers shall fit snugly to prevent ingress of driving rain, snow, or dust. The covers shall not contain any wrinkles or lines of stress concentration. The method of padding valleys on the edges of the covers shall be in accordance with figure 1.

3.4.1 Stretch loading The covers, when installed, shall be adjustable to and capable of withstanding a stretch loading of not less than 2 pounds per inch of width in all directions.

3.4.2 Seams and stitching The seams and stitching used in the manufacture of covers shall be in accordance with FED-STD-751.

3.4.2.1 Type I. All sewing shall be done with stitch type 301 to form a type LSC-2 seam with 3/4 inch gage. There shall be not less than four nor more than eight stitches per inch.

3.4.2.2 Type II. All sewing shall be done with stitch type 401 to form a type LSC-2 seam with 3/4 inch gage. There shall be not less than four nor more than eight stitches per inch.

3.4.3 Hems. Covers shall have a hem 1-1/2 inches wide on all free edges. Each edge of each hem shall have one row of stitching.

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3.4.4 Slits. Slits shall be provided for obstructions such as struts, stay wires, shafts, or other aircraft parts. Slits shall extend to the nearest free edge, unless another position is specified. Unless otherwise specified, the edges of each slit shall be closed by means of an interlocking fastener installed as shown on figure 2. Means for attaching and securing covers shall be accomplished by means of ties, straps, ropes or fasteners on the edge to permit fastening them around fuselage, wings, or some adjacent fittings. The hardware or fittings used for securing the cover shall be padded and the padding permanently attached, by sewing around the periphery, to prevent contact with the aircraft skin.

3.4.5 Patches. The covers shall be provided with reinforcement patches where they come in contact with sharp corners or projections.

3.4.6 Engine or transmission covers. The engine or transmission cover shall extend beyond the fire wall and the propeller or rotor hub. Typical designs are shown on figures 3 through 7.

- 3.4.6.1 Fasteners. Engine covers around the nacelles shall be closed with interlocking fasteners as specified herein. The interlocking fastener shall be offset $5^{\circ} \pm 1^{\circ}$ from the vertical centerline of the engine.

3.4.6.2. Sleeves for hot air duct. Two sleeves, each approximately 8 inches long and 13 inches in diameter, shall be attached to each engine cover to serve as a hot air duct when the free end of the sleeve is attached to a heater. One sleeve shall be so located as to coincide with the opening into the accessories compartment of the engine. The other sleeve shall be located at the nose section of the cowl. A piece of type I lightweight webbing conforming to MIL-W-5665, approximately 52 inches long and 1/2 inch wide, shall be sewn at the midpoint to each sleeve near its open end. The color of the webbing shall approximately match the color of the cover.

* 3.4.6.3 Sleeve for propeller or rotor blades. A sleeve approximately 10 inches long and of sufficient diameter to fit the propeller or rotor blade shall be attached to the engine or transmission cover for each propeller blade or rotor.

3.4.6.4 Grommets. Plain grommets conforming to MS20230 shall be placed on the underside of the cover to permit excess oil drainage.

3.4.7 Propeller and rotor blade covers. The propeller and rotor blade covers shall match the respective engine cover propeller sleeves or rotor head cover blade sleeves. A typical design is shown on figure 8.

3.4.8 Fuselage and armament covers. These covers shall be for the bombardier and pilot compartments, turrets, sight blisters, and all other gun openings.

3.4.9 Miscellaneous covers. Covers for ventilation duct openings, tail and nose wheel openings, landing gear wells, and any opening too large to be covered with 2-inch masking tape shall be provided, unless justification by the weapon system manufacturer can be substantiated that covers are not required.

3.4.10 Snap Fasteners (type II). Junctions between cover components, shall be secured with snap fasteners as shown on figure 9.

3.4.11 Fastening tapes. Fastening tapes conforming to MIL-F-21840, type II, may be used for fastening or securing flaps, pockets, folds, et cetera, when required. The tapes shall be of the size and class to match the fabric material being used in the protective cover.

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3.5 Carrying case(s) (type II). When specified (see 6.2), a carrying case(s) shall be provided for storing the cover(s). The design of the carrying case(s) shall be received prior to approval by the procuring activity. The case(s) shall be made from the same materials and construction features as used in fabricating type II covers. The design of the case shall include means for closing easily. Metallic parts shall be corrosion resistant or plated to resist corrosion.

3.6 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of MIL-STD-100 shall govern the manufacturer's part numbers and changes thereto.

3.7 Identification of product. Each cover shall be marked for identification in accordance with MIL-STD-130, plus any other special marking specified by the contract or purchase order.

3.8 Workmanship. The cover, including all parts and accessories, shall be uniform in quality and shall be free from irregularities which would adversely affect the appearance or serviceability of the cover.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified in paragraph 4.6.1 and 4.6.2. 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 paragraph 4.6.1 shall become a part of the contractor's overall inspection systems 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.

* 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 Inspection conditions. Unless otherwise specified, all inspections shall be performed accordance with the test conditions specified in 4.6.

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4.3.1 Test sample. One cover as described in 4.4 shall be subjected to the tests specified in 4.6.

4.4 First article inspections. The first article tests shall be conducted on a randomly selected unit and shall satisfy the requirements of 4.6 before the production of the remaining contracted units.

4.5 Quality conformance inspections. The quality conformance tests shall consist of the individual test.

4.5.1 Individual test. Each cover shall be subjected to an examination of product test as described under 4.6.

4.6 Test methods.

4.6.1 Examination of product. The cover shall be inspected to determine compliance with the requirements specified herein and on the applicable drawings with respect to materials, workmanship, and dimensions.

4.6.2 Installation. The cover shall be installed on the aircraft component being covered and examined for fit, alignment and function. A demonstration to ensure that the cover will withstand normal usage and handling encountered during installation, removal, and storage shall be performed.

4.7 Inspection of Preparation for delivery. Preservation, packaging, packing, and marking shall be inspected to determine conformance to the requirements of section 5 herein.

* 5. PACKAGING.

5.1 Preservation. Preservation shall be Level A, C, or Commercial as specified (see 6.2).

5.1.1 Level A. Covers shall be preserved to the MIL-STD-2073-1 requirements for this level.

5.1.2 Level C. Covers shall be preserved to the MIL-STD-2073-1 requirements for this level.

5.1.3 Commercial. Covers shall be preserved in accordance with the applicable requirements of ASTM D 3951.

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

5.2.1 Level A. Covers that have been preserved and packaged as specified in 5.1 shall be packed in exterior-type shipping containers that conform to PPP-B-601, overseas type. The closure of the shipping container shall be in accordance with the appendix of the applicable shipping container specification.

5.2.2 Level B. Covers that have been preserved and packaged as specified in 5.1 shall be packed in exterior-type shipping containers that conform to PPP-B-636, class weather resistant. The closure of the shipping container shall be in accordance with the appendix of the applicable shipping container specification.

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5.2.3 Level C. Covers that have been preserved and packaged as specified in 5.1 shall be packed in accordance with the requirements of MIL-STD-2073-1.

5.2.4 Commercial. Covers that have been preserved and packaged as specified in 5.1 shall be packed in accordance with the applicable requirements of ASTM D 3951.

5.3 Marking.

5.3.1 Level A, B, and C. In addition to any special or other identification markings required by the contract (See 6.2), each unit pack and exterior container shall be marked in accordance with MIL-STD-129.

5.3.2 Commercial. Covers shall be marked in accordance with the applicable requirements of ASTM D 3951,

5.4 Palletization. Unitized loads, commensurate with the level of packing specified in the contract or order shall be palletized in accordance with MIL-STD-147. Palletized loads shall be uniform in size and quantities to the greatest extent possible. If the container is of a size which does not conform to any of the pallet patterns specified in MIL-STD-147, the pallet pattern shall first be approved by the contracting officer

6. NOTES

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

6.1 Intended use. Covers conforming to this specification are intended to protect aircraft components from the weathering elements.

* 6.2 Acquisition requirements. Acquisition documents must specify the following

- a. Title, number, and date of the specification.
- b. Issue of DODISS to be cited in the solicitation, and if required the specific issue of individual documents referenced (see 2.1).
- c. Quantity and type of cover desired (see 1.2).
- d. Material for type II covers if other than specified (see 3.3.1.2).
- e. Type of aircraft for which the cover will be used.
- f. If warning streamers are required (see 3.3.1 1.3)
- g. Whether carrying cases are required (see 3.5).
- h. Location and conditions for preproduction testing (see 4.1 and 4.3).
- i. Applicable levels of packaging and packing (see 5.1 and 5.2).
- j. When palletization is required (See 5.4).

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* 6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on the contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's 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 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number,</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
4.6.1 & 4.6.2	DI-NDTI-80809A	Test/ Inspection Reports	- - -

The above DID's 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 (AMSCL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

* 6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.3.1. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and 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.

6.5.1 Cover. The cover(s) as used herein shall provide the necessary protection against the environments expected to be encountered during service life. These covers may be in any shape or form and will be fastened to the aircraft.

6.6 Subject term (keyword) listing

Armament Storage Protective Equipment
Cockpit, Covering, Protective Equipment
Engine, Environment Protection Equipment
Fuselage Environmental Covering
Jet Engine, Protection, Storage,
Rotor Blade, Storage Protection.

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6.7 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Air Force - 11
Army - AV
Navy - AS

Preparing activity:

Navy - AS
(Project No. 1730-0333)

Reviewers.

Air Force - 82
Army - AV
Navy - MC

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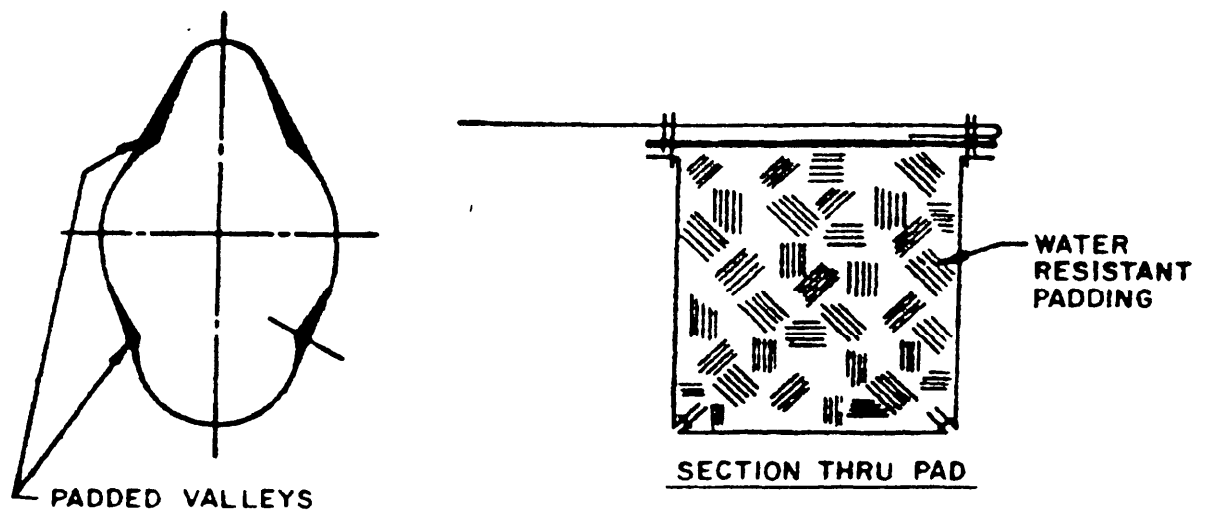


FIGURE 1. Method of padding valleys on edge of engine and cockpit covers.

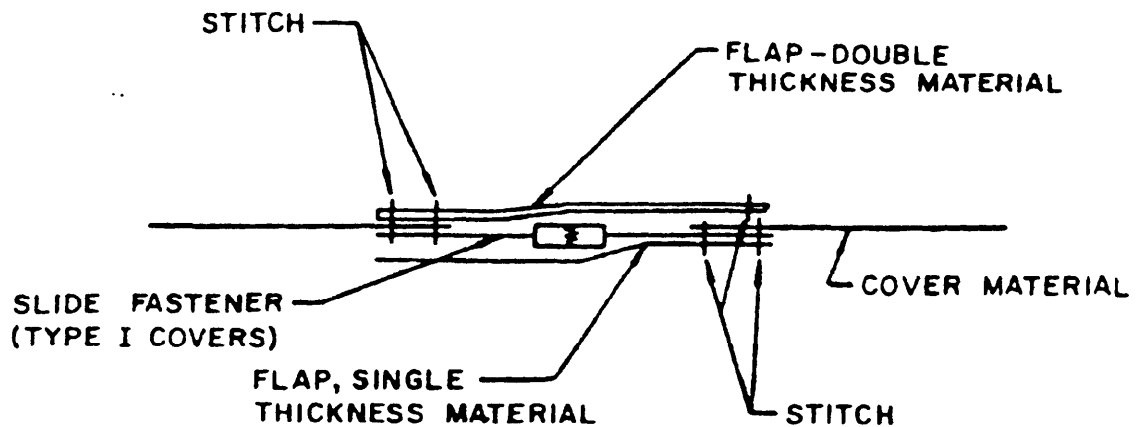


FIGURE 2. Cover closure.

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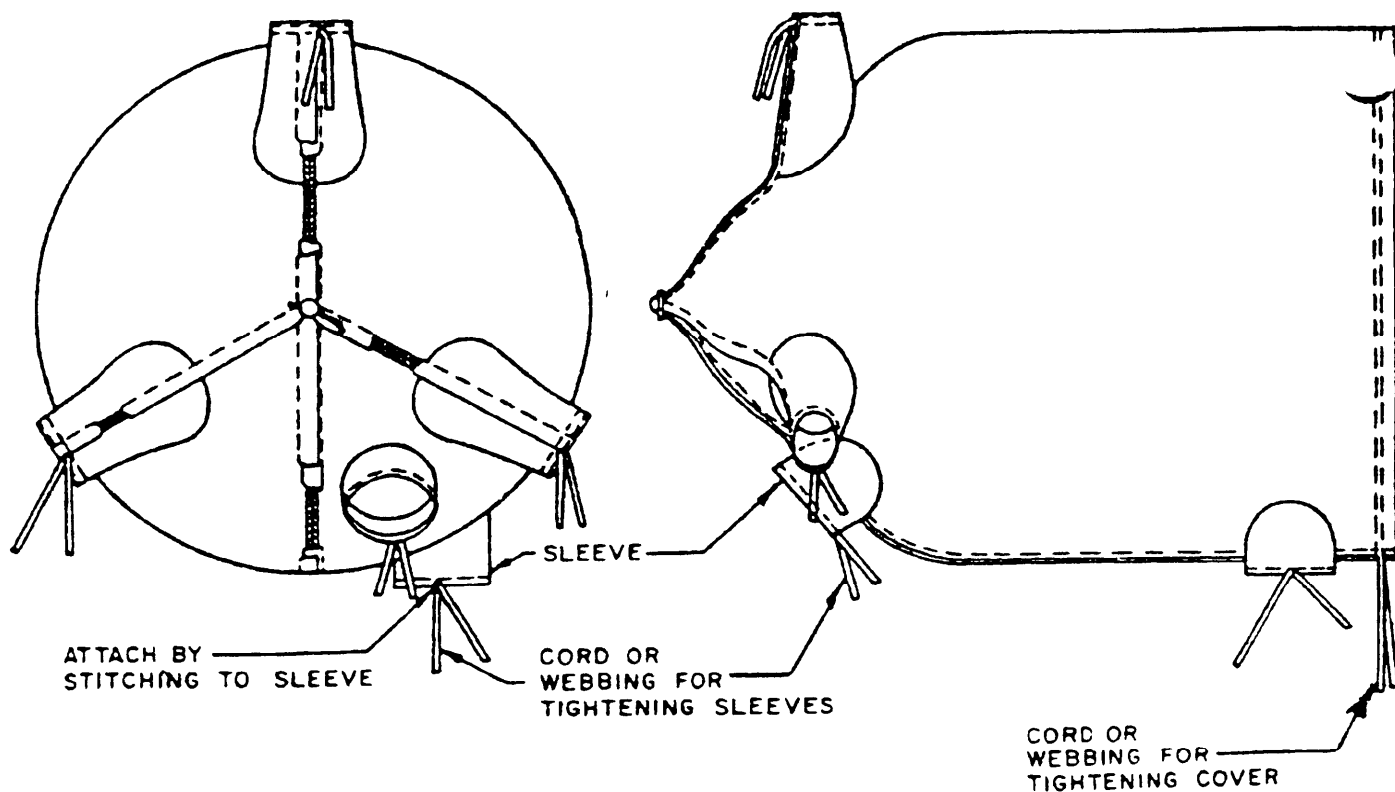


FIGURE 3. Typical cover for air-cooled-engines (3-blade propeller)

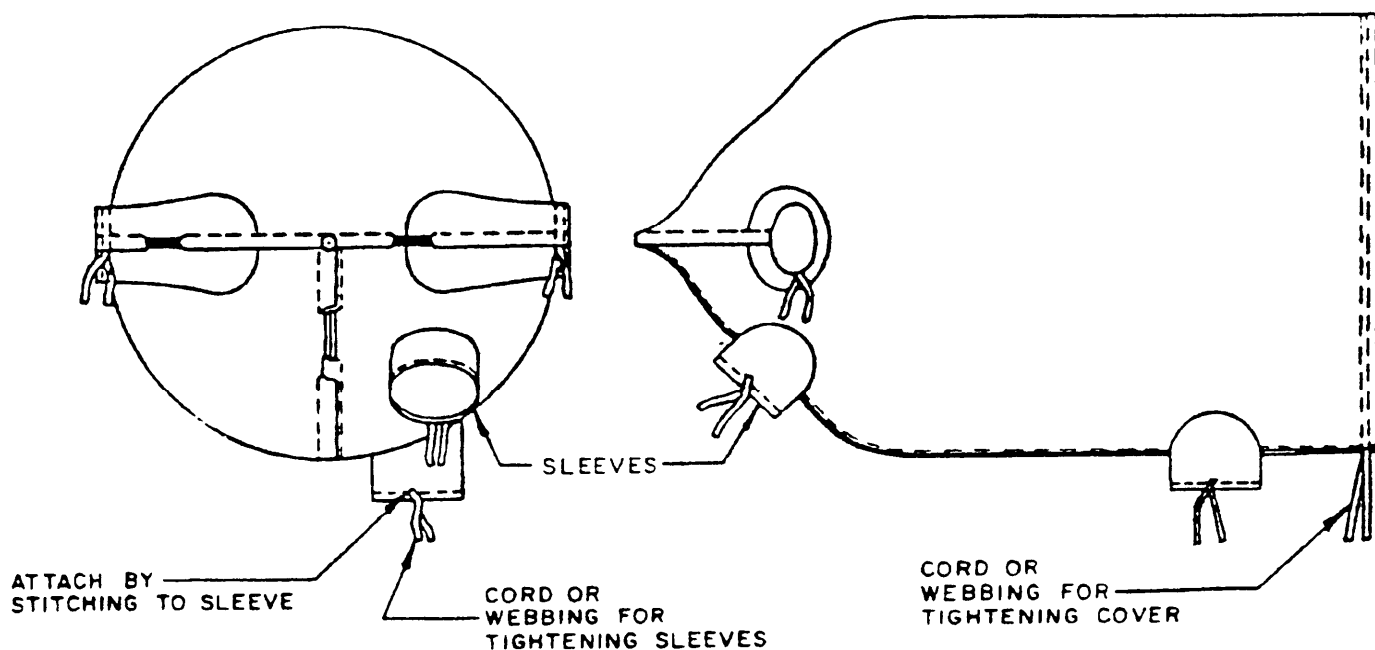


FIGURE 4. Typical cover for air-cooled engine (2-blade propeller)

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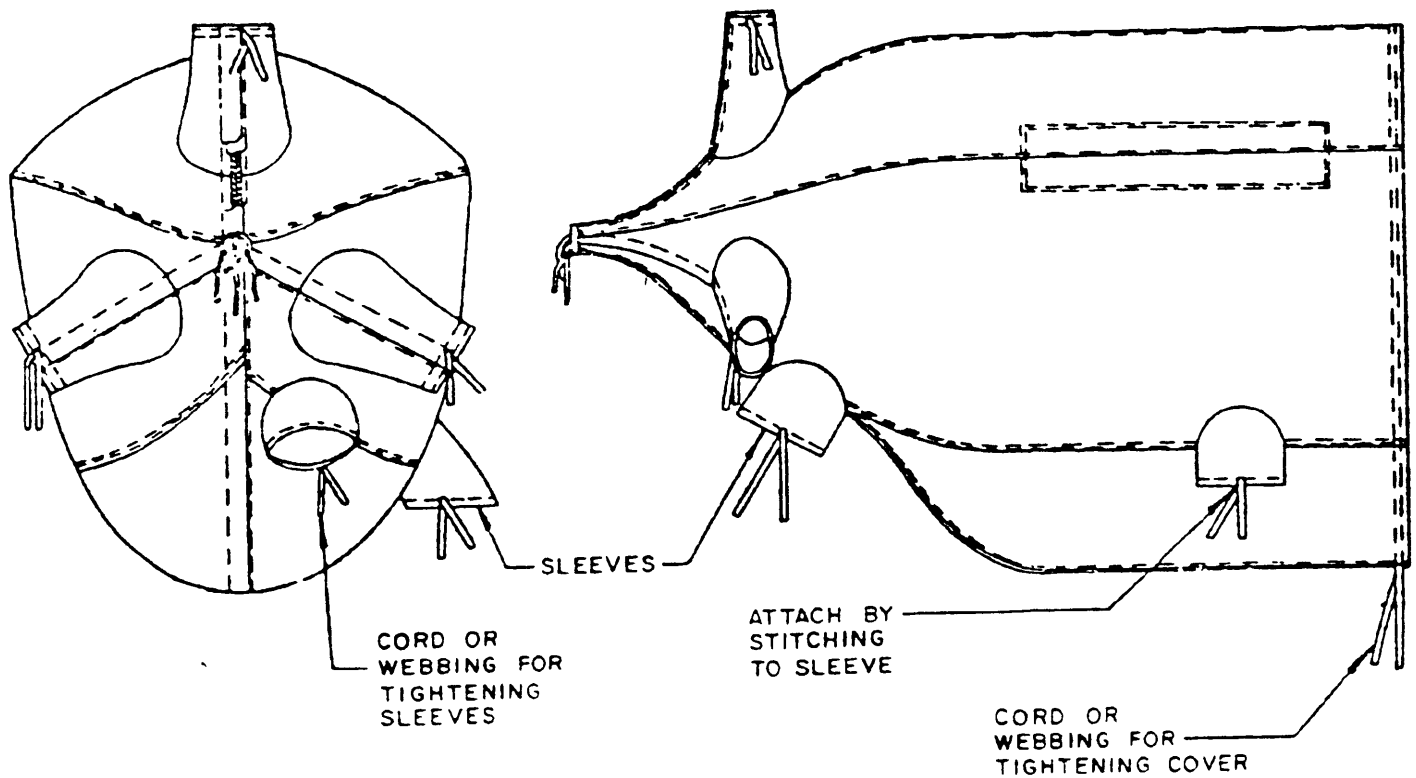


FIGURE 5. Typical cover for liquid-cooled engines (3-blade propeller)

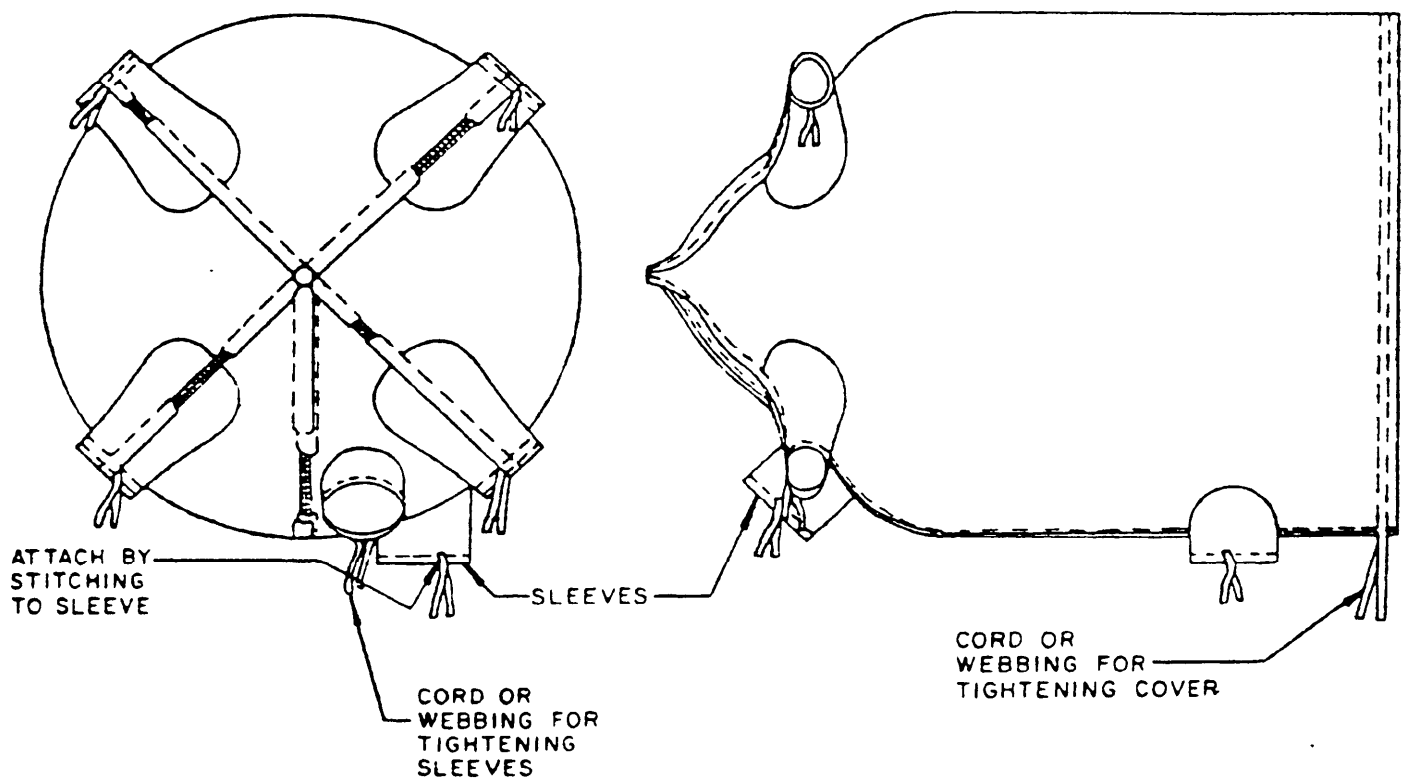
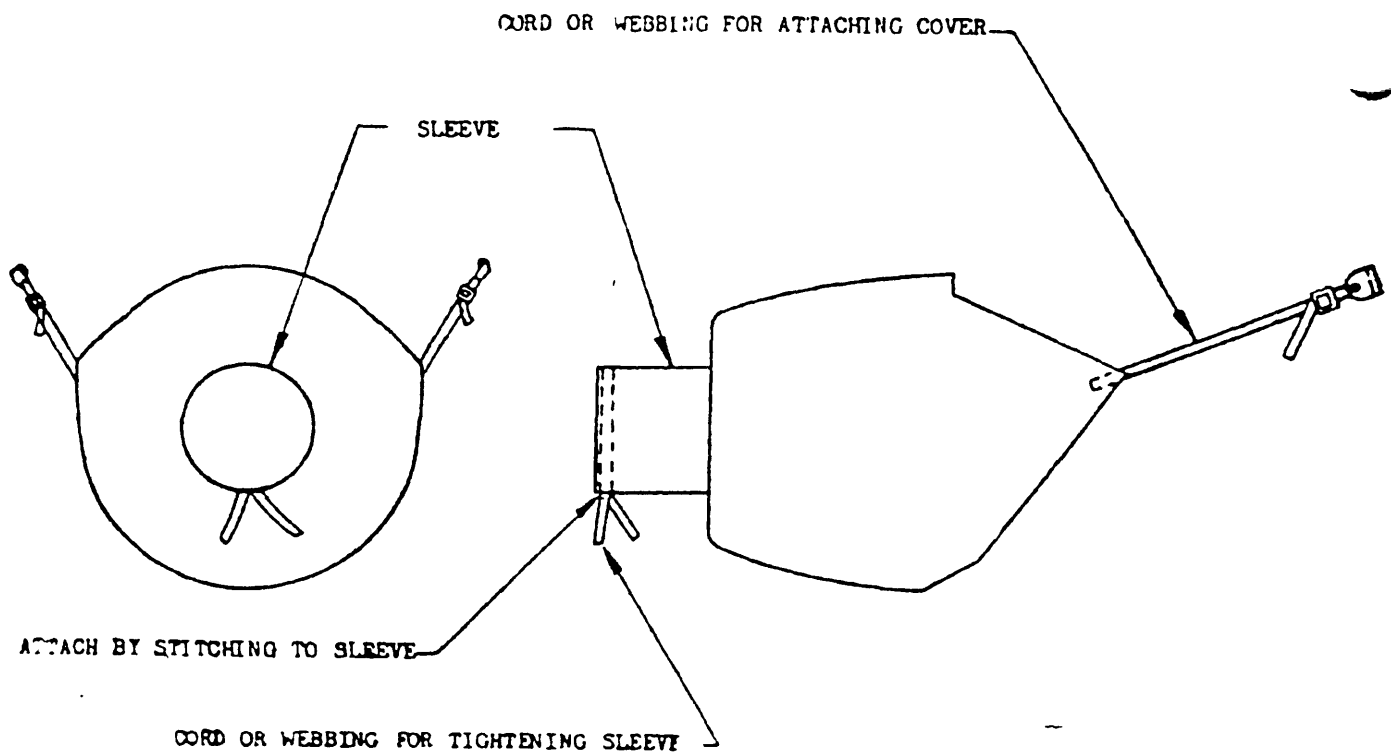
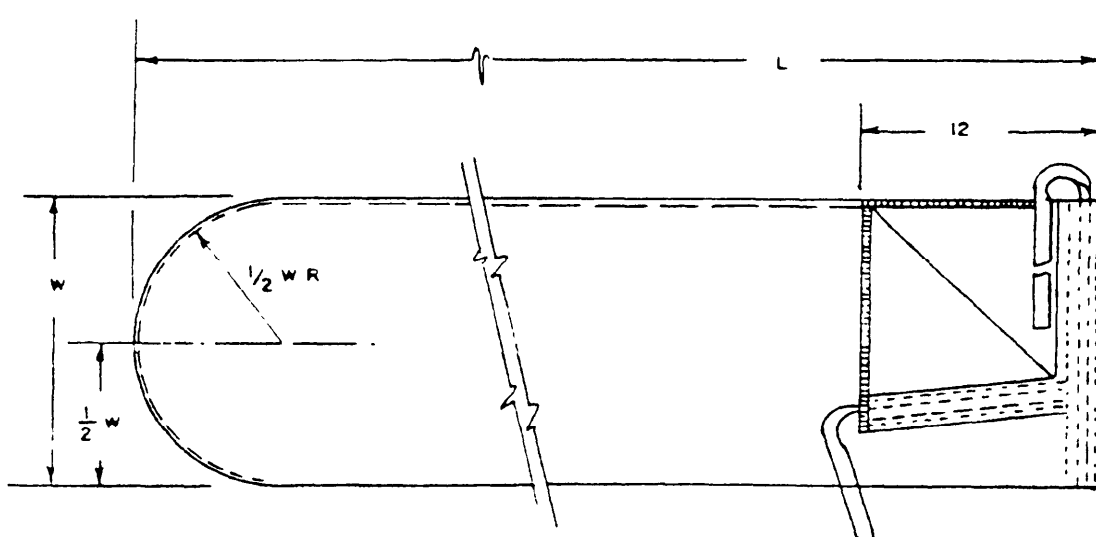
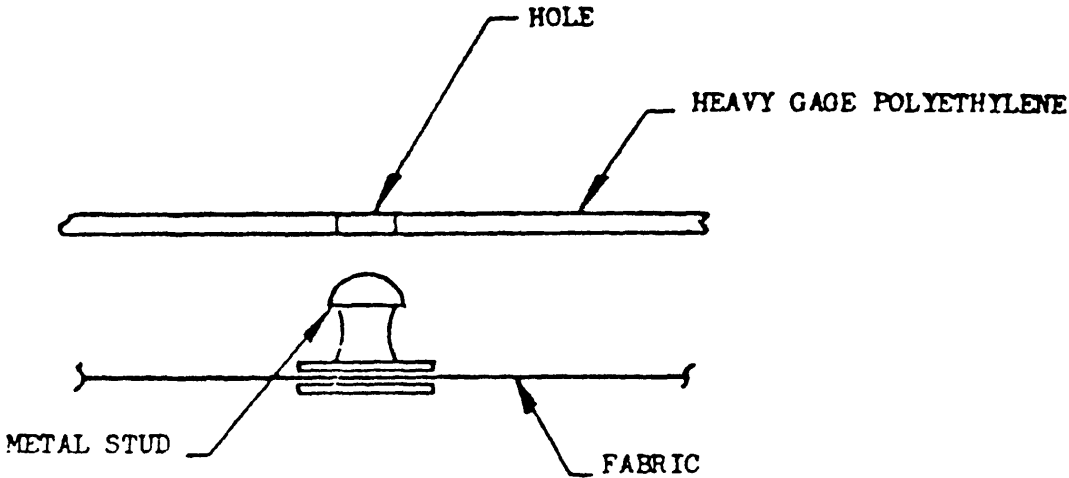


FIGURE 6. Typical cover for air-cooled engines (4-blade propeller)

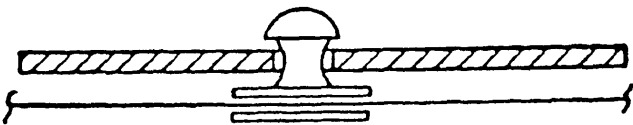
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FIGURE 7. Typical nose cover for jet aircraft engine.FIGURE 8. Typical propeller and rotor blade cover

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OPEN POSITION



CLOSED POSITION
CROSS SECTION

FIGURE 9. Snap fastener (for type II only)

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 MIL-C-5778D		2. DOCUMENT DATE (YYMMDD) 92-5-8	
3. DOCUMENT TITLE COVERS, AIRCRAFT COMPONENTS, GENERAL REQUIREMENTS FOR					
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			b. TELEPHONE (Include Area Code)		
COMMANDING OFFICER, NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION LAKEHURST SYSTEMS REQUIREMENTS DEPARTMENT			(1) Commercial (908) 323-7488 (2) AUTOVON 624-7488		
c. ADDRESS (Include Zip Code)			IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:		
CODE SR3 LAKEHURST, NJ 08733-5100			Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340		