

INCH-POUND

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 11 March 1991
 SUPERSEDING
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MILITARY SPECIFICATION

HARDWOOD; FLOORBOARDS AND PLATFORMS:
 FOR MILITARY VEHICLES

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

1. SCOPE

1.1 Scope. This specification covers hardwood floorboards and platforms fabricated for military vehicles (see 6.1 and 6.5).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form part of this specification to the extent specified herein. Unless otherwise specified, the issue of these documents shall be 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

FEDERAL

TT-W-572

- Wood Preservative: Water-Repellant.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, 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 2510

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

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- MIL-W-15154 - Wood Laminates, Dak (For Ship and Boat Use)
- MIL-A-22397 - Adhesive, Phenol and Resorcinol Resin Base (for Marine Service Use).
- MIL-C-46168 - Coating, Aliphatic Polyurethane Chemical Agent Resistant.
- MIL-C-53039 - Coating, Aliphatic Polyurethane, Single Component Chemical Agent Resistant.

STANDARDS

MILITARY

- MIL-STD-130 - Identification Marking of US Military Property.
- MIL-STD-45662 - Calibration System Requirements.

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

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified the issues of 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 D9 - Standard Definitions of Terms Relating to Wood.
- ASTM D4444 - Use and Calibration of Hand-Held Moisture Meters.

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

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AMERICAN WOOD PRESERVERS ASSOCIATION (AWPA)

C2 - Preservative Treatment by Pressure Process.

(Applications for copies should be addressed to the American Wood Preservers Association P.O. Box 849, Stevensville, MD 21666.)

NATIONAL HARDWOOD LUMBER ASSOCIATION (NHHLA)

Rules for the Measurement and Inspection of Hardwood and Cypress.

(Application for copies should be addressed to the National Hardwood Lumber Association, P.O. Box 34518, Memphis, TN 38134.)

(Non-Government standards and other publications are normally available from the organization that prepare or distribute the documents. These documents also may be available in or through libraries or other information services.)

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 specified document 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 6.2) in accordance with 4.4.

3.2 Material and treatment.

3.2.1 Hardwood. Floorboard and Platforms shall be fabricated from species of domestic hardwoods or imported hardwoods unless otherwise specified (see 6.2). Wood shall be free of characteristics and defects (see 3.2.4) that render it unsuitable for the intended use (see 4.8.1).

3.2.1.1 Domestic hardwoods. Domestic hardwoods include species of maple, red or white oak and American White Ash (FRAXINUS AMERICANA).

Maple

Red "Maple"	(ACER, RUBREM)
Sugar or Hard "MAPLE"	(ACER, SACCHARUM)
Black "Maple"	(ACER, NIGRUM)
Silver "MAPLE"	(ACER, SACCHARINUM)

Red Oak

Northern Red Oak	(QUERCUS, RUBBA)
Black Oak	(QUERCUS, VELUTINA)

White Oak

White Oak	(QUERCUS, ALBA)
Bur Oak	(QUERCUS, MACROCARPA)
Chestnut Oak	(QUERCUS, PRINUS)

The use of species grown in lowlands or swamps is unacceptable. Hardwoods shall conform to NHLA Rules for the Measurement and Inspection of Hardwood and Cypress (see 4.8.1).

3.2.1.2 Imported hardwoods. Imported hardwoods include species of Apitong or Keruing (DIPTEROCARPUS SSP.) or Kapur (DRYOBALANOPS SSP.) (see 4.8.1).

3.2.2 Moisture content. Unless otherwise specified (see 6.2), material shall be air-dried or kiln-dried to a maximum moisture content of 15 percent (%) or less at time of treatment (see 4.8.2).

3.2.3 Preservative treatment. Treatment shall be accomplished after all cutting, machining, or trimming has been accomplished. At the time of treatment, the moisture content shall be in accordance with the requirements noted in 3.2.2. Hardwood preservative treatment shall be a pressure treatment of light solvent solution of copper naphthenate, in accordance with composition B of TT-W-572, to a net minimum retention of 0.040 pound per cubic foot (PCF) of copper as measured by gauge or assay method for the zone of 0 to 0.6 inches.

For white oak hardwood, treatment to refusal is allowable. The pressure and treatment during the pressure period shall be maintained constant or increased within a range consistent for the material being treated until the quantity of preservative during each of two consecutive half-hour periods is more than 2 percent of the amount already injected.

For domestic hardwood species an alternate non-pressure treatment is acceptable, if the high solvent solution of copper naphthenate, in accordance with composition C of TT-W-572 is used, and a minimum net retention of 0.040 pound (pcf) of copper as

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If further modification is required after treatment, any new exposed surfaces from machining, cutting or trimming shall be treated with preservative.

After treatment the wood shall provide a paintable surface as described by the paintability requirement of TT-W-572 and tested in accordance with paintability and drying time test of TT-W-572. The species of wood tested shall be the same as furnished under the solicitation and paint shall conform to MIL-C-46168 or MIL-C-53039 (see 4.8.3).

3.2.4 Hardwood defects. Material used in the fabrication of floorboard components shall conform to the requirements of 3.2.4.1 through 3.2.4.6. Technical terms used in these paragraphs are defined in ASTM D9 (see 4.8.4).

3.2.4.1 Knots. No unbound knot or hole shall be permitted. Sound knots will be permitted, up to and including 1 inch in diameter. The sum of the diameters of all sound knots in any one-fourth length of a piece shall not exceed the width of the piece, nor shall any two knots of 1 inch or more in diameter be closer to each other than 8 inches (see 4.8.4).

3.2.4.2 End splits. End splits, exceeding the width of the piece in length, shall not be permitted. End splits shall only be allowed on one end of board (see 4.8.4).

3.2.4.3 Warping. Maximum warping shall not exceed 1/2 inch per 12 foot length as defined in NHLA Rules for the Measurement of Hardwood and Cypress (see 4.8.4).

3.2.4.4 Hit-or-miss surfacing. Hit-or-miss surfacing, with skips not over 1/16 inch deep between them, shall be permitted on the underside of the floorboards, but all floorboards shall be full thickness at the ends and over the cross bolsters (see 4.8.4).

3.2.4.5 Wood destroying organism defects. Open channels not more than 1/8 inch deep and 5 inches long will be permitted on the face of the board. On the underside of the board, channels shall be not greater than 1/4 inch wide and 8 inches long. No defects shall extend through the thickness of the piece (see 4.8.4).

3.2.4.6 Secondary hardwood defects. Fabricated wood components shall be free from the following characteristics or imperfections to the extent that they shall not decrease the strength or serviceability or be otherwise detrimental to the required service of the component (see 4.8.4).

Burls.
Season checks.
Sound stain or discoloration.
Sound streaks.
Small, sound, tight knots or small open knots.
Short splits.
Bark streaks and pockets.
Wormholes, except buckshot wormholes in clusters.
Bird peck.
Bird's-eye.
Slight wane on small pieces and medium wane on large pieces.
Slight variation in thickness.
Small end checks.
Slight honeycomb.
Occasional torn grain.
Occasional rough or hit-and-miss surfacing.
Other definitely minor imperfections.

3.3 Design and construction. Design and construction of floorboards and platforms shall conform to the applicable drawings and data supplied by the procuring activity (see 4.8.5 and 6.2).

3.3.1 Joints. Joints shall be of approved scarf or finger type, and shall be located only where adequately supported by cross-members (bolsters), and shall be so staggered as to assure maximum floor strength. Jointed construction of floorboard components, normally cut from one solid piece of lumber, shall be subjected to specific approval. Such glued components whether purchased by the contractor as dimension stock unworked, already worked to pattern, or to be incorporated in completed subassemblies, shall be manufactured by a laminator whose manufacturing facilities and products have been approved by the procuring agency (see 4.8.5.1).

3.3.1.1 Gluing. Gluing of hardwood floorboards shall be in accordance with MIL-W-15154, using adhesive conforming to MIL-A-22397 (see 4.8.5.2).

3.3.1.2 Dimensional lumber. Dimension lumber, used in the fabrication of any one glued piece or component, shall be of the same species of hardwood. It shall be matched for density and for direction of grain in each piece of wood (see 4.8.5.3).

3.4 Marking. Unless otherwise specified on the drawing, physical and identification markings of wood components shall be in accordance with MIL-STD-130. Fabricators of dimensional lumber shall stamp their identification and date of manufacture (month and year) so that after assembly their identification marks shall be

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located on the top surface and 6 inches from the front end of the component (see 4.8.6).

3.5 Workmanship. Workmanship shall be of the quality necessary to produce fabricated hardwood components free of defects which affect serviceability and appearance (see 4.8.7).

3.5.1 Quality impairment. Defects in wood components (see 3.2.4) shall not impair the quality of the joint or the fitting of hardware, and when practicable shall not be located on the normally visible surface of the assembled body. No knot split or similar defect shall be permitted at a bolt, nail, screw, glued joint, machined joint, mortise, or notch, where it may impair the strength and serviceability of the component (see 4.8.8).

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 the inspection requirements specified. 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, unless disapproved by the Government. The Government reserves the right to perform or witness any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to the prescribed requirements.

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

4.1.2 Inspection equipment. Unless otherwise specified in the contract, the supplier is responsible for the provisions and maintenance of all inspection equipment necessary to assure that supplies and services conform to contract requirements. Commercial, modified commercial, or supplier designed inspection

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equipment or measuring set-ups must be capable of repetitive measurements to an accuracy of the component tolerance. Calibration of inspection equipment shall be in accordance with MIL-STD-45662.

4.1.3 Certification. Where certification is required by the specification or contract or purchase order to verify material, processes, or component conformance to the specification, the contractor shall furnish or make available such certification with documented test results and performance and analytical data.

4.1.4 Contractor's Quality Assurance System. Unless otherwise specified by the procuring activity, the production contractor shall have and maintain an effective inspection and quality assurance system, acceptable to the Government for the production items. A current written description of the processes shall be submitted or made available to the contracting officer prior to initiation of production in accordance with the requirements contained or referenced in the production contract or purchase order. The production contract shall not be restricted to the inspection station or the method of inspection listed, provided that an equivalent control is included in the approved quality assurance procedure. The production contractor shall notify the Government of, and obtain approval for, any change to the written procedure that might affect the degree of control required by this documentation or other applicable documents referenced herein.

4.1.5 Government verification. All quality assurance operations performed by the contractor will be subject to government verifications at unscheduled intervals. Verification will consist of (a) surveillance of the operations to determine that practices, methods, and procedures of the written quality assurance system plan are being properly applied and (b) Government product inspection to measure the quality of the product being offered for acceptance. Deviations from prescribed or agreed upon procedures, or instance of poor practices which might have an adverse effect upon the quality of the product, will immediately be called to the attention of the contractor. Failure of the contractor to properly correct deficiencies shall be cause for suspension of acceptance until corrective action has been made, or until the conformance of the product to prescribed criteria has been demonstrated.

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TABLE I. Classification of inspections.

Title	Requirement	Inspection	First Article	Quality Conformance	
				Examination	Control Tests
Hardwood check	3.2.1, 3.2.1.1, 3.2.1.2	4.8.1	X	X	
Moisture content	3.2.2	4.8.2	X		X
Moisture content check	3.2.2	4.8.2.1		X	
Preservative treatment	3.2.3	4.8.3	X		X
Preservative treatment check	3.2.3	4.8.3.1		X	
Hardwood defects	3.2.4, 3.2.4.1 through 3.2.4.6	4.8.4	X	X	
Design and construction	3.3	4.8.5	X	X	
Jointed hardwood components	3.3.1	4.8.5.1	X		X
Jointed hardwood components check	3.3.1	4.8.5.1.1		X	
Gluing check	3.3.1.1	4.8.5.2	X	X	
Dimensional lumber check	3.3.1.2	4.8.5.3	X	X	
Marking	3.4	4.8.6	X	X	
Workmanship	3.5	4.8.7	X	X	
Quality impairment	3.5.1	4.8.8	X	X	
Packaging	5.1	4.9	X	X	

4.5 Inspection Provisions.

4.5.1 Examination. Visual, dimensional, and testing shall consist of examination of the inspection sample for conformance to the applicable drawings, processes, and the requirements of this specification. Examinations shall be performed utilizing the classification of defects in table II.

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4.5.2 Recurring deficiencies. A deficiency is recurring when the same defect occurs more than once in the same sample, or when the defect occurs in two successive samples. A defect may be considered recurring when the historical inspection records ("P" chart or approved equivalent) reflect such a condition. Recurring deficiencies shall be cause for the entire lot or lots to be inspected for the recurring deficiencies. The deficiencies shall be corrected by the contractor when found. Samples shall be subjected to the inspections and tests specified in table I.

4.5.3 Unclassified characteristics. All unclassified defects having no bearing on function, safety, interchangeability, or life, but which are considered departures from good workmanship, shall be noted in writing. Workmanship deficiencies falling within this category and recurring in five consecutive lots, or in ten lots or more within a 30-day period, shall be added to the defect characteristics. This deficiency may be deleted from the classification of characteristics when five consecutive lots are found free of this deficiency.

4.5.4 Failure. Failure of the sample shall be cause for rejection of the lot. The Government inspector shall reject the entire lot and shall stop acceptance of subsequent lots until evidence has been provided by the contractor that corrective action has been taken to validate the corrections to insure an acceptable lot.

TABLE II. Classification of defects.

Category	Characteristics	Defects	Method of Examination
101	Dimensions	Affects interchangeability or assembly.	Visual and Standard Measuring Equipment (SME).
102	Preservative	Insufficient amount, improper application, process, or type.	Visual, SME and operational.
103	Joints	Improper location, number, or type.	Visual and SME.
104	Material	Improper type species, defects greater than allowable deficiencies described in 3.2.4.	Visual and SME.
105	Moisture Content	Improper amount.	Visual and SME.

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106	Gluing	Improper type, insufficient amount, improper application	Visual
107	Marking	Improper position, missing.	Visual
108	Workmanship	Improper workmanship as defined by 3.5.	Visual

4.6 Quality conformance inspection (QCI).

4.6.1 QCI and acceptance. To determine conformance to section 3 in its entirety, each completed lot shall be examined and inspected as specified in tables I and II by the contractor. Each lot shall be fully inspected for compliance and correction of defects shall be reinspected as necessary to validate corrections and to assure an acceptable lot.

4.6.2 Failure. If a lot fails to pass any acceptance test or inspection specified in table I, the Government inspector shall reject the entire lot and shall stop acceptance of subsequent lots until evidence has been provided by the contractor that corrective action has been taken to validate the correction to insure an acceptable lot.

4.7 Control test.

4.7.1 Frequency. The Government shall select at random, one lot out of each ten lots produced or one lot for each month of production for the control tests and inspections specified in tables I and II. These tests and inspections shall be performed by the contractor and witnessed by the Government inspector.

4.7.2 Failure. If the lot selected fails to pass any of the control tests and inspections, the Government inspector shall stop acceptance, examinations, and testing of subsequent lots until such time as conditions causing the failure have been remedied. Any defect found during or as a result of the test and inspection shall be prima facie evidence the lot(s) accepted subsequent to the previous acceptance control test lot(s) are similarly defective unless evidence satisfactory to the contracting officer is furnished by the contractor that there are not similar defects. Such defects on all lot(s) shall be corrected by the contractor at no cost to the Government. The contractor shall correct defects on all lot(s) represented by the failed control test lot(s). Another lot(s) with corrective action implemented shall be subjected to the control test.

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4.8 Examinations, inspections, and tests.

4.8.1 Hardwood check. The wood shall be checked to assure the proper species are supplied to determine conformance to the requirements of 3.2.1, 3.2.1.1 and 3.2.1.2.

4.8.2 Moisture content. The wood shall be tested per ASTM D4444 and meet the requirement specified by 3.2.2.

4.8.2.1 Moisture content check. The moisture content certification shall be checked to determine conformance to the requirements specified by 3.2.2.

4.8.3 Preservative Treatment. The hardwood preservative treatment shall be monitored, tested, and checked using the appropriate procedures of AWPA C2 for conformance to the requirements specified by 3.2.3.

4.8.3.1 Preservative treatment check. The hardwood preservative treatment certification shall be checked for conformance to the requirements specified by 3.2.3.

4.8.4 Hardwood defects. Each lot shall be checked for conformance to the requirements specified by 3.2.4, and 3.2.4.1 through 3.2.4.6.

4.8.5 Design and construction. Each lot shall be checked for conformance to the requirements specified by 3.3.

4.8.5.1 Jointed hardwood components. Jointed construction shall be checked for conformance to the requirements specified by 3.3.1.

4.8.5.1.1 Jointed hardwood components check. Any authorized jointed components shall be checked for adequacy of joints to determine conformance to requirements specified by 3.3.1.

4.8.5.2 Gluing check. The certification for the gluing of hardwood and gluing shall be checked to determine conformance to the requirements specified by 3.3.1.1.

4.8.5.3 Dimensional lumber check. The dimension lumber shall be checked to determine conformance to 3.3.1.2.

4.8.6 Marking. Each lot shall be checked for conformance to the requirement specified by 3.4.

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4.8.7 Workmanship. Each lot shall be checked for conformance to the requirements specified in 3.5.

4.8.8 Quality impairment. Each lot shall be checked for conformance to the requirements specified by 3.5.1.

4.9 Packaging. Preservation, packaging, packing and marking shall be checked for conformance to 5.1 of this specification and the contract or purchase order.

5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking for the desired level of protection shall be in accordance with the applicable packaging requirements specified by the contracting authority (see 4.9 and 6.2).

6. NOTES

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

6.1 Intended use. The fabricated wood components covered by this specification are intended for use in military vehicles.

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.
- c. If first article is required (see 3.1).
- d. If responsibility for inspection and the place of inspection is other than the contractor's (see 4.1).
- e. First article inspection categories (see 6.3), sample size for each category, and specific tests for each sample.
- f. If responsibility for inspection equipment shall be other than specified (see 4.1.2).
- g. First article inspection, if other than as specified (see 4.4).
- h. Arrangements for the first article inspection, approval of test results, and the disposition of first article (see 6.3).
- i. Government's rights and conditions for waiving first article inspection (see 6.3).

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- j. Sample size for QCI examination and tests (see 4.6).
- k. QCI acceptance criteria (see 4.6).
- l. Control test sample size, frequency of tests, and disposition of lots covered by the sample size and of defective items (see 4.7).
- m. Selection of applicable levels of packaging requirements (see 5.1).
- n. Categories of inspection of packaging, sample size for each category, approval of test results, and disposition of defective items (see 4.9).
- o. If inspection conditions are other than as specified (see 4.3).
- p. If moisture content is other than as specified (see 3.2.2).
- q. Applicable drawings and data (see 3.3).
- r. If wood species are other than as specified (see 3.2.1).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the first article samples should be preproduction samples, initial production samples, or first production items and for each inspection category, specify the number of samples to be inspected and for each inspection category, specify the number of samples to be inspected and the specific tests to be performed on each sample. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examination, approval of first article test results, and disposition of first articles. Invitation 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 a 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.

6.3.1 Guidance on applying first article. When first article sample is required, at least three parts produced under the production contract should be subjected to first article inspection.

6.4 Definition. Terms relating to wood as used in this specification are defined in ASTM D9 and the NHLA Rules for the Measurement and inspection of Hardwood and Cypress.

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6.5 Cross-reference. Imported lumber species specified by section 3.2.1.2 have been added to this specification. Components deleted from this specification and covered under MIL-C-62419 include sills, bolsters, rub rails, panels, tailgates, troop seats, lazy backs, and racks.

6.6 Subject term (key word) listing.

CARC
 Dimension lumber
 Fabricated wood vehicle components
 Gluing of wood vehicle components
 Preservative treatment, wood
 Transport vehicle components, wood
 Wood components
 Wood defects

6.7 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. Also see paragraph 6.5.

6.8 AMC policy on AQLs/LTPDs. This specification is certified to be in compliance with the current Army Material Command (AMC) policy for the elimination of AQL/LTPDs (Acceptable Quality Levels/Lot Tolerance Percent Detectives) from military specifications.

Custodians:

Army - AT
 Navy - YD
 Air Force - 99

Preparing Activity:

Army - AT

Review Activities:

Army - MD, MI, AR
 DLA - CS

(Project 2510-0116)

User Activity:

Navy - MC
 Air Force - 85