

NOT MEASUREMENT
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MIL-C-3580E
15 January 1991
SUPERSEDING
MIL-C-3580D
23 September 1975

MILITARY SPECIFICATION
CRANE AND CRANE-SHOVELS, TRUCK, CRAWLER,
AND WHEEL MOUNTED, FULL-REVOLVING,
AND THEIR ATTACHMENTS, PACKAGING OF

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

1. SCOPE

1.1 Scope. This specification covers the requirements for materials, methods and procedures for the preservation, packing and marking of full-revolving, wheel-mounted, crawler truck cranes and crane-shovels and their attachments.

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: USA Belvoir Research, Development, and Engineering Center, ATTN: SIRBE-TSE, Fort Belvoir, VA 22060-5606 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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SPECIFICATIONS

FEDERAL

- L-P-378 - Plastic Sheet and Strip, Thin Gauge, Polyolefin.
- TT-P-664 - Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant.
- TT-V-119 - Varnish, Spar, Phenolic-Resin.
- TT-V-121 - Varnish, Spar, Water-Resisting.
- UU-T-81 - Tags, Shipping and Stock.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-B-1055 - Barrier Material, Waterproofed, Flexible.
- PPP-P-40 - Preservation and Packing of Hand Tools; Tools and Tool Accessories for Power Driven, Metal and Wood-Working Machinery.
- PPP-T-60 - Tape: Packaging, Waterproof.

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- MIL-C-104 - Crates, Wood; Lumber and Plywood, Sheathed, Nailed and Bolted.
- MIL-P-116 - Preservation, Methods of.
- MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
- MIL-S-196 - Support Items, Accessories and Kits, Mechanical, Packaging of.
- MIL-L-2105 - Lubricating Oil, Gear, Multipurpose, Metric.
- MIL-C-3774 - Crates, Wood; Open, 12,000- and 16,000-Pound Capacity.
- MIL-E-10062 - Engines: Preparation for Shipment and Storage.
- MIL-V-13811 - Varnish, Waterproofing, Electrical, Ignition.
- MIL-E-16298 - Electric Machines Having Rotating Parts, Accessories and Associated Support Items: Packaging of.
- MIL-L-21260 - Lubricating Oil, Internal Combustion Engine, Preservative and Break-In.
- MIL-T-22085 - Tapes, Pressure-Sensitive, Adhesive, Preservation and Sealing.
- MIL-L-23398 - Lubricant, Solid Film, Air-Cured, Corrosion-Inhibiting, NATO Code Number S-749.
- MIL-L-46010 - Lubricant, Solid Film, Heat-Cured, Corrosion-Inhibiting.
- MIL-B-46176 - Brake Fluid, Silicone, Automotive, All Weather, Operational and Preservative, Metric.
- MIL-P-52905 - Paint, Arctic, Camouflage, Removable.

STANDARDS

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.

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MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking, and Waterproofing; with Appropriate Test Methods.

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

2.2 Non-Government publications. 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)

- D 3953 - Strapping, Flat Steel and Seals.
- D 4675 - Selection and Use of Flat Strapping Materials.

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

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION (NMFTA)

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Association, ATTN: Traffic Order Section, 2200 Mill Road, Alexandria, VA 22314.)

UNIFORM CLASSIFICATION COMMITTEE (UCC)

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, ATTN: Tariff Publishing Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational 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 specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article pack. The contractor shall furnish a first article pack for examination and testing within the time frame specified (see 6.2), to prove, prior to starting production packaging that the applied preservation, packing, and marking comply with the requirements of this specification. Examination and test shall be as specified in section 4 and shall be subject to surveillance and

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approval by the Government (see 6.3). The first article pack may be accomplished utilizing either the first article model or a production model. When the production model is utilized, any preservation and packing shall be removed by the contractor at no expense to the Government, when requested by the Government, to facilitate comparison between the first article model and the production model.

3.2 Materials. Materials shall be as specified herein and in applicable specifications and standards. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification.

3.3 Preservation. Preservation shall be level A, B, or C as specified (see 6.2).

3.3.1 Level A.

3.3.1.1 Disassembly. Except as required by the transportability requirements of the end item specification, disassembly shall be confined to those parts and assemblies that are vulnerable to damage and loss and which would interfere with carrier limitations of height, width, and weight. Any further disassembly shall be in accordance with the recommendations of the equipment contractor and shall be subject to the approval of the contracting officer. Removed bolts, nuts, screws, pins, and washers shall be reinstalled in mating parts and secured to prevent their loss. Keys removed shall be secured in the keyway of the primary component or shaft.

3.3.1.2 Matchmarking. Parts removed and mating parts on the cranes, crane-shovels, and attachments shall be matchmarked when necessary to facilitate reassembly. Large parts shall be matchmarked identically by stenciled letters or numerals using lusterless white enamel overcoated with varnish conforming to TT-V-121, or identically matchmarked with paint conforming to MIL-P-52905. Small parts removed and mating parts on the basic units and attachments shall be matchmarked and identified with tags conforming to UU-T-81, type A or B, class 2 attached to mating parts with wire or twine. Marking on tags shall be with waterproof ink.

3.3.1.3 Preservatives. Preservatives, except as otherwise specified herein, shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

3.3.1.4 Repainting. Painted surfaces of the cranes, crane-shovels and attachments, on which the paint has been damaged, shall be cleaned and repainted in accordance with the painting requirements of the end item specification (see 6.4).

3.3.1.5 Unprotected metal surfaces. Unpainted exterior metal surfaces of cranes, crane-shovels, and attachments, except machined surfaces, requiring the application of a contact preservative, such as tie rods, adjusting rods, clevises, bolts, nuts, coil springs, cable sheaves, pins, grease fittings, drawbars, and any other surface, including those exposed by disassembly, shall be coated with type P-1 preservative. Exposed exterior machined surfaces shall be coated with type P-6 preservative. Surfaces coated with type P-6 preservative shall be wrapped or covered with greaseproof barrier material conforming to MIL-B-121, type I, grade A, class 2, secured in place with tape conforming to

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PPP-T-60, type IV or MIL-T-22085, type II. Unpainted metal information plates, except photosensitized anodized aluminum plates, shall be coated with varnish conforming to MIL-V-13811 or TT-V-119.

3.3.1.6 Engines. Engines and engine accessories shall be preserved in accordance with MIL-E-10062, level A, type I, method I.

3.3.1.6.1 Winterization components.

3.3.1.6.1.1 Priming pumps. Interior surfaces of hand-operated priming pumps shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10, applied as follows: The intake and discharge lines shall be disconnected from the engine. The pump shall be operated with the open end of the intake line immersed in the preservative. Excess preservative shall be drained and the lines shall be reconnected. Unpainted exterior surfaces of the pump shall be coated with varnish conforming to MIL-V-13811 or TT-V-119.

3.3.1.6.1.2 Pressure-priming dischargers. Unpainted exterior surfaces of pressure-priming dischargers shall be coated with type P-1 preservative. The threaded surfaces of the cap shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. The cap shall be sealed to the body of the discharger with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.6.1.3 Burners. Unpainted exterior metal surfaces of the burners requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative. All openings into burners which will permit the entrance of dirt or water shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.6.1.4 Fuel tanks. The fuel tanks for heater fuel, if not equipped with baffles, shall be fogged with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10 and the excess preservative drained. Fuel tanks with baffles shall be completely filled with the preservative lubricating oil and drained. The drainplug and fill cap threads shall be coated with the preservative lubricating oil and the drainplug and fill cap shall be reinstalled. The preservative may be reused for processing other tanks but shall be discarded when it shows evidence of contamination (see 6.5).

3.3.1.6.1.5 Electric motors. Electric motors shall be preserved in accordance with MIL-E-16298, level A, using the alternate method specified for equipment assembled to machines.

3.3.1.6.1.6 Blowtorches. Unpainted metal surfaces of blowtorches (and blowtorch-type burners) requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative. Interior surfaces requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. Each blowtorch (burner) shall be packed in a box conforming to PPP-B-636, W5c or W6c. Box closure shall be in accordance with the appendix to the box specification, method V.

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3.3.1.7 Drive shafts and universal joints. Unprotected unpainted surfaces of drive shafts and universal joints shall be coated with type P-1 preservative. Dust boots shall be reinstalled after the preservative dries.

3.3.1.8 Gears.

3.3.1.8.1 Exposed gears. Unpainted surfaces of exposed gears shall be coated with type P-1 preservative or with primer conforming to TT-P-664.

3.3.1.8.2 Enclosed gears. Gears operating on lubricating oil (SAE 10, 30, or 50) shall have the housing filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade as applicable, and the housing and controls tagged to indicate: "The preservative contained in the gear housing is adequate for operation. Do not drain until the first required lubricant change." Gears operating on gear lubricant (SAE 80 or 90) shall have the housings filled to the operating level with lubricant conforming to MIL-L-2105, grade as applicable, and the housings and controls tagged to indicate: "The lubricant contained in the gear housing is adequate for operation. Do not drain until the first required lubricant change." Gears not operating on lubricating oil (SAE 10, 30, 50, 80, or 90) shall have the housings filled to the operating level with the approved lubricant required for operating, and the housing and controls tagged to indicate: "The housing contains the approved lubricant. Do not drain until the first required lubricant change." Tags shall conform to UU-T-81, type A or B, class 2. Marking on tags shall be with waterproof ink.

3.3.1.9 Drive chains.

3.3.1.9.1 Exposed drive chains. Exposed drive chains shall be coated with enough type P-3 or P-9 preservative to insure penetration of the preservative to the inner surfaces of the rollers, pins and bushings. After the excess preservative has drained, the entire chain shall be coated with type P-1 preservative.

3.3.1.9.2 Enclosed drive chains. Enclosed drive chains shall be preserved as specified for enclosed gears (see 3.3.1.8.2).

3.3.1.10 Clutches. Clutches shall not be operated after being preserved as specified herein.

3.3.1.10.1 Disc type. With the cover plates removed and the clutch engaged, all accessible metal interior components of the clutch shall be sprayed with a thin film of primer conforming to TT-P-664. When specified (see 6.2), the clutch shall be disassembled sufficiently to permit the application of a continuous thin film (maximum 0.75 mil) of the same primer to friction surfaces of the pressure plates. Clutch control mechanisms not enclosed shall be coated with type P-1 preservative. After being sprayed, spring-loaded-type clutches shall have the clutch pedal secured in a partially disengaged position to eliminate contact between the disc facings and the pressure plates. Snap-over-center and toggle-in-type clutches shall be completely disengaged. Cover plates shall be reinstalled.

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3.3.1.10.2 Band and shoe type. Clutch drum facings and control mechanisms enclosed in housings shall be coated with primer conforming to TT-P-664. Clutch control mechanisms not enclosed with housings shall be coated with type P-1 preservative.

3.3.1.10.3 Cone type. The unlined cones and control mechanisms shall be coated with primer conforming to TT-P-664. Control mechanisms not enclosed in housings shall be coated with type P-1 preservative. The clutch shall be disengaged to prevent the linings from adhering to the unlined cones.

3.3.1.10.4 Jaw type. Clutch jaws, shifter yokes, and machined surfaces of shafts shall be coated with type P-1 preservative. Control mechanisms enclosed within housings shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. Control mechanisms not enclosed within housings shall be coated with type P-1 preservative.

3.3.1.10.5 Flywheel, oil type (running in oil). The clutch shall be preserved at the same time as the engine preservative run-in. The housing shall be filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade as applicable. The fill plug threads shall be coated with the preservative lubricating oil and the plug reinstalled. When the engine reaches its normal operating temperature, the clutch shall be operated to insure coating of all parts and surfaces with the preservative. Upon completion of preservation, all openings into the clutch housings shall be sealed with tape conforming to MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the clutch control indicating: "The clutch is filled to the operating level with the applicable grade of preservative lubricating oil and is suitable for operating until the first required lubricant change. Remove tape from housing openings prior to operating the clutch." Marking on tags shall be with waterproof ink.

3.3.1.10.6 Flywheel, oil type (lubricated by engine lubricating system). The clutch shall be processed at the same time as the engine preservative run-in. When the engine reaches its normal operating temperature, the clutch shall be operated to insure coating of all parts and surfaces with the lubricant. Upon completion of processing, all openings into the clutch housing shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the clutch control indicating: "Remove tape from housing openings prior to operation of the clutch." Marking on tags shall be with waterproof ink.

3.3.1.10.7 Steering clutches.

3.3.1.10.7.1 Dry type. Dry disc-type steering clutches shall be preserved as specified in 3.3.1.10.1 (see 6.2). Other dry-type steering clutches shall be preserved as specified in 3.3.1.10.2, 3.3.1.10.3, and 3.3.1.10.4 for the applicable type of dry clutch.

3.3.1.10.7.2 Oil type. The clutch housing shall be filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade as applicable. The fill plug threads shall be coated with the preservative lubricating oil and the fill plug shall be reinstalled. The clutch shall be operated to insure coating of all parts and surfaces with the preservative. Upon completion of preservation, all openings into the clutch housing shall be sealed

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with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the clutch control indicating: "The housing is filled to the operating level with the applicable grade of preservative oil and is suitable for operation until the first required lubricant change. Remove tape from housing openings prior to operation of the clutch." Marking on tags shall be with waterproof ink.

3.3.1.10.7.3 Hydraulic boosters (having a separate oil supply). Hydraulic boosters having a separate oil supply reservoir shall be preserved at the same time as the steering clutch. The oil reservoir shall be filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade as applicable. The fill plug threads shall be coated with the preservative oil. The fill plug shall be reinstalled. The booster shall be operated to insure coating of all parts and surfaces with the preservative oil. Upon completion of preservation, all openings into the system shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the clutch control indicating: "The hydraulic booster is filled to the operating level with the applicable grade of preservative oil and is suitable for operation until the first required lubricant change. Remove tape from openings into the system prior to operating the clutch." Marking on tags shall be with waterproof ink.

3.3.1.11 Brakes.

3.3.1.11.1 General. Unless otherwise specified (see 6.2), all accessible metal surfaces enclosed within brakedrums (such as adjusting wedges, pins, eccentrics, cam levers, linkages, anchors, retracting springs, and similar parts) shall be coated with primer conforming to TT-P-664. Brakes shall be released to permit towing without destroying the brake preservation. Exterior brake parts (such as clevises, pins, linkages, adjusting mechanisms, and any other threaded or unpainted metal surface) shall be coated with type P-1 preservative. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each brake control indicating: "To prevent destroying the brake preservation, do not apply brakes while the unit is being moved." Marking on tags shall be with waterproof ink. Note: For totally enclosed interior braking systems that would require major disassembly to gain access to the interior components, the requirements for coating the parts shall not be required.

3.3.1.11.2 Hydraulic brake system.

3.3.1.11.2.1 Systems operating on nonpetroleum base fluid. The systems shall be filled to the operating level with preservative fluid conforming to MIL-B-46176 and the brakes actuated to insure coating all interior parts and surfaces with the preservative fluid. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each brake control indicating: "The brake systems on this unit are filled to the operating level with preservative fluid and are good for indefinite storage and limited operation in ambient temperatures not lower than -10 °F. Prior to regular operation or operation in ambient temperatures lower than -10 °F, the brake system shall be drained and refilled to the operating level with the nonpetroleum base fluid recommended for operation." Marking on tags shall be with waterproof ink.

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3.3.1.11.2.2 Systems operating on petroleum base fluid. The brake and steering systems that operate on petroleum base hydraulic fluids shall be filled to the operating level with the operating fluid. The brake and steering systems shall be actuated to insure coating of all interior parts and surfaces with the fluid. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each system control indicating: "The brake systems are filled with the approved operating fluid. No not drain." Marking on tags shall be with waterproof ink.

3.3.1.11.3 Air-actuated brake systems. The air-actuated brake systems shall be drained. Interior surfaces of the air supply tanks shall be fogged with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. The excess preservative shall be drained. Threaded openings and the drainplug threads shall be coated with preservative oil and the plugs shall be reinstalled. Air line filters shall be drained and closed. The exhaust ports of relay emergency, quick release, and relay valves shall be closed by inserting pipeplugs or by sealing the ports with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the brake controls and to the valves and service lines indicating: "Remove plugs or tape from the exhaust ports, quick release, and relay valves prior to operating the brakes." Marking on tags shall be with waterproof ink.

3.3.1.11.4 Air hydraulic brakes. Air hydraulic brakes, as applicable, shall be preserved in accordance with 3.3.1.11.1, 3.3.1.11.2, and 3.3.1.11.3. To preserve the interior surfaces, the plugs and hose shall be removed from housings and connectors and preservative lubricating oil conforming to MIL-L-21260, type I, grade 10 shall be sprayed through each opening. The plugs and hose shall be reinstalled and the brake pedal shall be operated through two cycles. The plugs and hose shall again be removed and the interior surfaces shall again be sprayed as specified herein. The plugs and hose shall again be reinstalled.

3.3.1.11.5 Vacuum brake systems. Vacuum brake systems shall be preserved in accordance with the applicable requirements of 3.3.1.12 and the subparagraphs thereto.

3.3.1.12 Vacuum systems.

3.3.1.12.1 Pumps. Interior surfaces of pumps, including all working parts such as rotors and rotor shafts, vanes and vane slots, air and oil passages, gates, thrust pins, springs, and cylinder walls, shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10, applied in a manner and quantity to insure coating of all interior parts of the pumps. Excess preservative shall be drained. Openings into the pumps shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the pump control indicating: "Remove tape from pump openings prior to operating the pump." Marking on tags shall be with waterproof ink.

3.3.1.12.2 Compensating check, control and relay valves. Interior surfaces of the valves, including all working parts such as shafts, valve seats and stems, retracting springs, and the interior surfaces of the air chambers shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10.

3.3.1.12.3 Diaphragm-type chambers and pull-type cylinders. Exterior surfaces or the diaphragm chambers, cylinders, valves, vacuum tank piping, compensator

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rods, clevises, pins, linkages, adjusting mechanisms, or any other threaded or unpainted exterior surfaces of the vacuum systems shall be coated with type P-1 preservative.

3.3.1.13 Hydraulic systems (except brake or steering). The hydraulic fluid supply tanks shall be filled to the operating level with the hydraulic fluid recommended for operation. The pistons shall be retracted as far as practicable into the cylinders and secured. When the pistons cannot be fully retracted, the exposed portions of the piston rods (ramshafts) shall be coated with type P-6 preservative and the coated surfaces wrapped or covered with barrier material conforming to MIL-B-121, type I, grade A, class 2, extending the wrap approximately 2 inches on the ram cylinder. The wrap or cover shall be secured in place with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. When the pistons can be fully retracted, any remaining unpainted surfaces of the piston rods (ramshafts) shall be coated with type P-1 preservative. Wrapping will not be required. The hydraulic control valves shall be secured in the neutral position and exposed surfaces of rods preserved as specified for piston rods. Hose shall not be disconnected.

3.3.1.14 Automatic transmission, fluid couplings and torque conversion transmissions.

3.3.1.14.1 Automatic transmissions and fluid couplings. The housings of automatic transmissions and fluid couplings shall be filled to the operating level with fluid or lubricant recommended for operation. The transmission and fluid couplings shall be operated at sufficient engine speed to insure coating of all interior parts and surfaces with the fluid or lubricant. Openings into the housings shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the control levers indicating: "The housing is filled to the operating level with the approved fluid or lubricant. Do not operate this unit until tape has been removed from the openings." Marking on tags shall be with waterproof ink.

3.3.1.14.2 Torque conversion transmissions.

3.3.1.14.2.1 Lubricating oil operated. The converter shall be preserved at the same time as the engine. At the beginning of engine preservation, the converter housing shall be filled to the operating level with the approved operating fluid or lubricant. The converter shall be operated at sufficient engine speed, during fuel system preservation, to insure coating of all interior parts and surfaces with the fluid or lubricant. Openings into the housing shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each converter control indicating: "The converter housing is filled to the operating level with the approved fluid or lubricant required for operation. Do not drain. Remove tape from housing openings prior to operation of the converter." Marking on tags shall be with waterproof ink.

3.3.1.14.2.2 Diesel fuel operated. The converter shall be preserved at the same time as the engine. At the beginning of engine preservation the system shall be drained of diesel fuel. The converter system shall be filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. The converter shall be operated at sufficient engine speed

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during fuel system preservation to insure coating of all interior surfaces and parts with the preservative. The preservative shall remain in the system. Openings into the system shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to the converter control indicating: "The converter system is filled to the operating level with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. Prior to operation of this equipment the preservative oil shall be drained and the converter system filled to the operating level with fluid or lubricant recommended for operation. Remove tape from openings into the system." Marking on tags shall be with waterproof ink.

3.3.1.15 Exposed linkages. All exposed linkages (except governor linkages and linkages equipped with lubrication fittings) shall be coated with type P-9 preservative. Governor linkages shall be coated with type P-6 preservative. Linkages with lubrication fittings shall be lubricated with the lubricant required for operation.

3.3.1.16 Wheels, axles and bearings. Wheels and hubs, if removed for any reason, shall have the interior surfaces of the hubs and the bearing surfaces of the axles and spindles coated with type P-11 preservative. Coated surfaces of the axles or spindles shall be wrapped or covered with barrier material conforming to MIL-B-121, type I, grade A, class 2. The wrap or cover shall be secured in place with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. Bearings, if removed, shall be coated with type P-11 preservative and individually preserved in accordance with MIL-P-116, method IC-1. Openings of the hubs shall be covered with barrier material specified herein and the barrier material secured in place with tape specified herein.

3.3.1.17 Rubber tires. Tires mounted on wheels not removed from the equipment shall be inflated to maximum operating pressure for maximum load. Tires mounted on rims and wheels (spare tires and wheels removed from the equipment) shall be inflated to two-thirds value of the recommended operating pressure.

3.3.1.18 Crawlers. Unpainted metal surfaces of sprockets, bogie wheels, rollers, pins, and adjusting linkages shall be coated with type P-1 preservative.

3.3.1.19 Instrument panels. Instruments, meters and gages not protected by a metal cover or by an enclosed cab shall have the instrument glass or gage glass covered with barrier material conforming to MIL-B-121, type I, grade A, class 2, over which a fitted piece of hardboard or 1/4-inch thick plywood shall be placed and secured with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.20 Trouble lights, lamp assemblies, reflectors, and rear-vision mirrors. Trouble lamps, lamps, reflectors, and rear-vision mirrors, if removed, shall be individually preserved in accordance with MIL-P-116, method III, using as the containers, boxes conforming to PPP-B-636, W5c or W6c, style optional. When specified (see 6.2), lamps, reflectors and rear-vision mirrors, if not removed, shall be covered with barrier material conforming to MIL-B-121, type I, grade A, class 2. The barrier material shall be secured in place with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.21 Gear shifts and control levers. Unpainted metal surfaces of handles, handgrips, and levers shall be coated with type P-1 preservative. Composition and rubber handgrips (if not enclosed within a full cab) shall be removed and

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preserved in accordance with MIL-P-116, method IC-1, and placed in the toolbox, or the handgrips shall be consolidated packed as specified in 3.3.1.41.1. The threaded surfaces exposed by removal of handgrips shall be coated with type P-1 preservative. When composition or rubber handgrips are left in place (except in full cabs), the grips shall be wrapped with barrier material conforming to PPP-B-1055, class E-2, and the wrap secured in place with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.22 Drivebelts and pulleys. Drivebelts shall be removed or released from tension. Pulley grooves shall be coated with primer conforming to TT-P-664. Belts removed shall be preserved in accordance with MIL-P-116, method IC-1.

3.3.1.23 Seat backs, armrests, cushions, and floormats. Equipment not equipped with fully closed cabs shall have the seat backs, armrests, cushions, and floormats that are removable, removed and individually wrapped with barrier material conforming to PPP-B-1055, class E-2 or wrapped with black polyethylene conforming to L-P-378 (6 mil). The barrier material or plastic film shall be secured with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. Seat backs, armrests, seat cushions, and floormats that are not removable from equipment (that is not equipped with a closed cab) shall be wrapped or covered in place with barrier material or plastic film specified herein and the wraps secured with tape specified herein. A 2-inch opening for drainage shall be made in the barrier material or plastic film at the underside of the seat backs, armrests and cushions.

3.3.1.24 Windshield wiper arms and blades. Windshield wiper arms and blades shall be removed and preserved in accordance with MIL-P-116, method IC-1. The preserved wiper arms and blades shall be placed in the toolbox or shall be consolidated packed as specified in 3.3.1.41.1. Exposed wiper shafts shall be coated with type P-1 preservative.

3.3.1.25 Locks, keys, and key openings. Interiors of locks shall be coated with solid film lubricant conforming to MIL-L-46010 or MIL-L-23398. The locks shall be operated to insure penetration of the lubricant. Openings into exterior locks shall be sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. Switch keys, cab door keys, and padlocks with keys shall be preserved in accordance with MIL-P-116, method IC-1. The preserved keys and padlocks with keys shall be placed in the toolbox. A tag conforming to UU-T-81, type A or B, class 2 shall be attached in a conspicuous location indicating: "Keys for this equipment are preserved and placed in the toolbox." Marking on tags shall be with waterproof ink.

3.3.2.26 Hinges and fasteners. Hinges and metal fasteners shall be coated with type P-7 preservative.

3.3.1.27 Engine hoods. Engine hoods shall be closed and secured.

3.3.1.28 Outriggers. Unpainted metal surfaces of outriggers, such as beam assemblies, plates, pins, hinges, legs, and supporting jacks shall be coated with type P-1 preservative. The outrigger telescoping or swing beams shall be retracted and secured in the retracted position in a manner to prevent movement during handling or shipment.

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3.3.1.29 Power take-off and power control units. Power take-offs and brakes shall be preserved as specified for similar components specified herein for parts and assemblies of similar design and having similar characteristics.

3.3.1.30 Winches. Components of winches such as gears, clutches, and brakes shall be preserved as specified for similar components specified herein. Wire rope for winches shall be preserved as specified in 3.3.1.31 and the rope rewound on the winch drums.

3.3.1.31 Wire rope. Wire rope (except galvanized) shall be coated with type P-1 preservative, applied by drawing the wire rope through a trough filled with preservative over an arrangement of three pulleys, or by any other convenient manner so that the rope will be completely immersed in the preservative. Excess preservative shall be removed by a swab around the cable guide in the end of the trough. Cables normally attached to drums and winches shall be wound on the drums and secured. Each length of wire rope which weighs 150 pounds or less and which is not attached to a cable drum shall be coiled to the minimum safe diameter and the coil securely tied with at least four, evenly spaced, individual, soft-annealed wire ties. Each coil shall be provided with a metal rustproof double-eyelet-type identification tag. The tag shall be securely laced to the inside of the coil with soft annealed wire. The tag shall indicate the size, length, attachment, name, make, and model of equipment for which the rope is intended. Each length of rope weighing in excess of 150 pounds shall be wound on a wooden reel. Each reel of rope shall be provided with a tag specified herein and indicating the information contained herein for coiled wire rope. Wire rope on drums outside the cab shall be covered with barrier material conforming to MIL-B-121, type I, grade A, class 2. The barrier material shall extend around the rope on the drum and be of sufficient width to be taped to the flanges of the drum with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. A 2-inch minimum opening for drainage shall be made in the barrier material at the underside of the drum.

3.3.1.32 Electric wiring systems. Exposed ends of wires, plug openings, sockets, coupling plugs, and terminals shall be covered and sealed with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.3.1.33 Soft-top trucks. Soft-type tops, such as canvas, shall be removed and the top material carefully and compactly folded or rolled. Each top shall be packed in a box conforming to PPP-B-636, V3c, style RSC. Box closure shall be in accordance with the appendix to the box specification, method V. Windows shall be rolled down and the opening for the window and guide in each door shall be sealed with tape specified herein.

3.3.1.34 Boom angle indicator. Unpainted metal surfaces of the boom angle indicator shall be coated with type P-1 preservative. When practical, the indicator shall be removed from the boom and wrapped with barrier material conforming to PPP-B-1055, class C-1. The wrap shall be secured with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. When it is not practical to remove the indicator from the boom, wood blocks thick enough to provide protection to the pendulum shall be used to protect the indicator from mechanical damage or movement. The blocks shall be placed on each side of the pendulum and secured in place with hook bolts or strapping. Strapping shall be as specified in 3.4.1.1.1.

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3.3.1.35 Piledriver hammers. Interior surfaces of air-operated piledriver hammers shall be coated with preservative lubricating oil conforming to MIL-L-21260, type I, grade 10. All openings shall be sealed with metal or plastic caps or plugs. Exposed surfaces of piston rods (ramshafts) shall be coated with type P-6 preservative. The coated surfaces of the rods shall be wrapped with greaseproof barrier material conforming to MIL-B-121, type I, grade A, class 2. The wrap shall be secured with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II. Unpainted exterior surfaces shall be coated with type P-1 preservative.

3.3.1.36 Component-parts groups for attachments. Components comprising each parts group shall be preserved as specified herein for components having similar characteristics.

3.3.1.37 Fire extinguishers. Unpainted exterior surfaces of fire extinguishers requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative. Each fire extinguisher shall be packed in a box conforming to PPP-B-636, W5c or W6c, style optional. Box closure shall be in accordance with the appendix to the box specification, method V.

3.3.1.38 Maintenance tools. Maintenance tools shall be preserved and packed in accordance with PPP-P-40, level A.

3.3.1.39 Technical publications. Technical publications for each unit of equipment or attachment shall be preserved together in accordance with MIL-P-116, method IC-1.

3.3.1.40 Repair parts. Unless otherwise specified herein, the preservative application criteria and applicable methods of preservation of MIL-P-116 shall be used to preserve and pack the repair parts. When specified, repair parts shall be preserved and packed in accordance with MIL-S-196, level A, and when parts are not specifically covered in MIL-S-196, an applicable submethod of preservation of MIL-P-116 shall be used (see 6.2).

3.3.1.41 Consolidation.

3.3.1.41.1 Components. Small components removed from basic units (both unit-packed and unpacked), maintenance tools, and technical publications shall be consolidated packed. The toolbox shall be utilized as a container and the toolbox lid shall be closed and secured. The remainder of the components that will not fit in the toolbox shall be consolidated packed in close-fitting boxes conforming to PPP-B-601, overseas type, style optional, or in nailed wood boxes conforming to PPP-B-621, overseas type, style optional. The size, number, and weight of the boxes shall be determined by the available space and convenience for securing to the basic unit in a manner that will not increase cubage or interfere with towing the unit or lifting with slings. Strapping shall conform to ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675.

3.3.1.41.2 Repair parts for basic units. The repair parts for each basic unit or equipment shall be consolidated packed in one or more containers as specified in 3.3.1.41.1. The size, number, and weight, and the securing to the basic unit shall be as specified in 3.3.1.41.1.

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3.3.1.41.3 Repair parts for attachments. Repair parts for each attachment shall be consolidated packed in one or more containers as specified in 3.3.1.41.1. The size, number, and weight, and the securing of the attachment shall be as specified in 3.3.1.41.1.

3.3.1.41.4 Component-parts groups for attachments. The component-parts group for each attachment shall be consolidated packed in one or more containers as specified in 3.3.1.41.1. The size, number, and weight shall be determined by the convenience for securing to the attachment in a manner not to increase cubage or interfere with lifting the attachment with slings, or increase cubage when packed with boxed attachments.

3.3.2 Level B. Unless otherwise specified, level B preservation shall be as follows:

3.3.2.1 Disassembly and matchmarking. Disassembly shall be as specified for level A. Matchmarking shall be as specified for level A, except that marking on tags will not be required to be with waterproof ink.

3.3.2.2 Preservatives. Preservatives specified herein shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

3.3.2.3 Unprotected surfaces. Unprotected exterior metal surfaces of basic units and attachments requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with preservatives as specified for level A, except information plates are not required to be coated with varnish.

3.3.2.4 Engines. The fuel system, lubricating system, combustion chambers, valves, batteries, cooling system, and drivebelts shall be preserved in accordance with MIL-E-10062, level A, type I, method I, except that coating of pulley grooves with primer will not be required.

3.3.2.5 Enclosed gears and chains. The gear housings and chain housings shall be filled to the operating level with the applicable type and grade of lubricant required for operation. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each housing in a conspicuous location indicating: "This housing is filled with the applicable type and grade of lubricant required for operation."

3.3.2.6 Clutches.

3.3.2.6.1 Disc type. Spring-loaded-type clutches shall have the clutch pedal secured in a partially disengaged position. Snap-over-center and toggle-in-type clutches shall be completely disengaged.

3.3.2.6.2 Flywheel (oil type), steering (oil type), and hydraulic boosters. Flywheel clutches (oil type), oil-type clutches, steering clutches, and hydraulic boosters shall be preserved as specified in 3.3.1.10.5, 3.3.1.10.6, 3.3.1.10.7.2, and 3.3.1.10.7.3.

3.3.2.7 Automatic transmissions, fluid couplings, and torque converters. Automatic transmissions, fluid couplings, and torque converter housings (except diesel-fuel-operated torque converters) shall be filled to the operating level

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with the applicable type and grade of fluid or lubricant required for operation. A tag conforming to UU-T-81, type A or B, class 2 shall be attached to each control indicating: "The housing is filled with applicable type and grade of fluid or lubricant required for operation." Diesel-fuel-operated torque converters shall be preserved and tagged as specified for level A (see 6.5).

3.3.2.8 Exposed gears. Unpainted surfaces of exposed gears shall be coated with type P-1 preservative.

3.3.2.9 Exposed drive chains. Exposed drive chains shall be coated with type P-3 or P-9 preservative.

3.3.2.10 Winterization components. Winterization components shall be preserved as specified in 3.3.1.6.1.1 through 3.3.1.6.1.6.

3.3.2.11 Hydraulic systems (including hydraulic brakes). Hydraulic systems, including hydraulic brakes, shall be preserved and tagged as specified in 3.3.1.11.2.1, 3.3.1.11.2.2, and 3.3.1.13.

3.3.2.12 Lamps, reflectors, and rear-vision mirrors. Lamps, reflectors, and rear-vision mirrors, if removed, shall be individually packed in close-fitting boxes conforming to PPP-B-636, type CF, class domestic, variety SW, grade as applicable.

3.3.2.13 Instrument panels. For equipment with instrument panels exposed, all instruments and instrument panels shall be protected as specified for level A.

3.3.2.14 Seat backs, armrests, and cushions. For equipment not equipped with fully enclosed cabs, the seat backs, armrests, and cushions shall be protected as specified for level A.

3.3.2.15 Locks and keys. Switch keys, cab door keys, and padlocks with keys shall be placed in the toolbox.

3.3.2.16 Windshield wiper arms and blades. Windshield wiper arms and blades shall be removed and placed in the toolbox.

3.3.2.17 Rubber tires. Rubber tires shall be inflated as specified for level A.

3.3.2.18 Fire extinguishers. The fire extinguishers shall be individually packed in close-fitting boxes conforming to PPP-B-636, type CF, class domestic, variety SW, grade as applicable.

3.3.2.19 Maintenance tools, technical publications, and repair parts. Maintenance tools, technical publications, and repair parts shall be preserved and packed as specified in 3.3.1.38, 3.3.1.39, and 3.3.1.40 (see 6.2).

3.3.2.20 Consolidation. Consolidation of components removed from basic units and attachments shall be as specified in 3.3.1.41.1, 3.3.1.41.2, 3.3.1.41.3, and 3.3.1.41.4, except in all cases, boxes shall be domestic type and strapping is not required to be zinc-coated.

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3.3.3 Level C. The basic units, attachments, components, repair parts, tools, and technical publications shall be preserved to prevent corrosion, deterioration, and damage during handling and shipment from the contractor to the initial destination.

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

3.4.1 Level A.

3.4.1.1 General.

3.4.1.1.1 Strapping. Strapping shall be in accordance with ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675.

3.4.1.2 Basic units of equipment. The basic units shall be shipped unboxed. Consolidated containers shall be positioned on the basic unit either inside or outside the cab, and shall be positioned so as not to increase cubage or interfere when the unit is lifted or towed. The containers shall be securely fastened to the basic unit by bolting or with strapping in such a manner as to prevent damage to the basic unit or to the contents of the containers. Strapping shall be as specified in 3.4.1.1.1. Steering wheels, steering clutches, and controls shall be accessible for use. Wheels and crawler tread assemblies shall be free to rotate. However, wheels and crawler tread assemblies shall be removed from basic units exceeding railroad clearance limitations of height, width, and weight. Consolidated containers that cannot be secured to the basic units shall be shipped separately from but at the same time as the basic unit for which intended.

3.4.1.2.1 Cabs. Cab windows and doors shall be closed and secured. When specified (see 6.2), the glass windows and windshields shall be protected from breakage by covering each glass with fitted plywood or sheet-metal panels secured in place with strapping or by bolting. Strapping shall be as specified in 3.4.1.1.1. A minimum clearance of 1 inch shall be provided between the protective panels and the glass. The panels shall be painted the same color as the cab. Any openings into the roof of the cab shall be covered with barrier material conforming to MIL-B-121, type I, grade A, class 2 and the barrier material secured in place with tape conforming to PPP-T-60, type IV or MIL-T-22085, type II.

3.4.1.2.2 Truck-mounted and wheel-mounted cranes and shovels. The revolving hoisting unit shall be positioned on the chassis in the normal position for transport to meet the requirements of railroad or other carrier width limitations and to reduce cubage to the minimum. The hoisting unit shall be locked to the hoisting unit base assembly and to the chassis while the chassis and swing brakes are engaged. Other locking devices and such additional ties as may be required to meet shipment regulations shall be provided. Unless otherwise specified, and if space permits, in order to prevent damage to bearings, the revolving hoisting unit shall be supported with wood cribbing placed on each side of the center pin between the chassis and the revolving hoisting unit to support and balance the hoisting unit and to relieve the strain from the center pintle. The cribbing shall be secured by bolting or with strapping. Strapping shall be as specified in 3.4.1.1.1. The locking and cribbing of the revolving hoisting unit shall be done in a manner that will not make the basic unit immobile.

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3.4.1.2.2.1 Basic units, wheels on. When railroad or other carrier height and width limitations will not be exceeded, cranes and crane-shovels shall be shipped with the wheels and tires installed. To reduce the bouncing effect encountered in transit of wheel-mounted and spring-supported cranes and crane-shovels, the load on the wheels shall be relieved with wood A-frames installed under the equipment during shipment. The A-frames shall be constructed 1/4-inch higher than the distance from the floor of the carrier to the point where the support is to be applied. Spring action during shipment shall be eliminated by blocks placed and secured between the chassis axles and the unit frame. Blocks shall be tied down with strapping. Strapping shall be as specified in 3.4.1.1.1.

3.4.1.2.2.2 Basic units, wheels removed. When the wheels are removed from the chassis to meet railroad or other carrier height and width limitations, the wheels and tires shall be placed and secured by strapping or by bolting onto the basic unit or to the floor of the carrier. Strapping shall be as specified in 3.4.1.1.1. Cushioning materials shall be provided between the tires and all contacting surfaces to protect the tires from physical or mechanical damage. Wood skids constructed in accordance with MIL-C-104, and of sufficient size to support the basic unit and to provide clearance and protection from damage for those parts made vulnerable to damage by removal of the wheels, shall be secured to the basic unit in such a manner as to insure safe shipment and provide secure anchorage on the carrier to prevent shifting lengthwise or crosswise.

3.4.1.2.3 Crawler-mounted cranes and shovels. The revolving hoisting unit shall be positioned on the crawler base so as to meet railroad or other carrier limitations and to reduce cubage to the minimum. The hoisting unit shall be locked to the crawler base while the swing lock and crawler lock brakes are engaged. Other locking devices and all additional anchors and ties that may be required to meet carrier regulations for shipment shall be provided. To relieve the weight from the center pintle of the basic unit and to prevent damage to the bearings, the revolving hoisting unit and the counterweight shall be supported with a modified wood-type A-frame applied under the counterweight between the counterweight and the floor of the transportation carrier. The frame shall be constructed so that it can be used in the same manner for waterborne shipments.

3.4.1.2.3.1 Basic units, treads removed. When it is necessary to remove the treads from the basic unit to meet railroad or other carrier width or height limitations, the basic unit shall be prepared for shipment as specified in 3.4.1.2.2.2. Each crawler tread shall be rolled into a bundle and each bundle secured with strapping. Strapping shall be as specified in 3.4.1.1.1. The bundled treads shall be secured to the floor of the transportation carrier or packed on wood skids as specified in 3.4.1.2.3.2.

3.4.1.2.3.2 Revolving hoist assembly, crawler assembly detached. When it is necessary to detach the crawler truck assembly from the revolving hoist assembly to meet railroad or other carrier height, width, and weight limitations, wood skids shall be secured to the hoist assembly in such a manner as to insure safe shipment and provide secure anchorage on the transportation carrier to prevent shifting lengthwise or crosswise. The wood skids shall be constructed in accordance with MIL-C-104. The skids shall be of sufficient size to support the revolving hoist assembly and shall provide clearance and protection from damage for those parts made vulnerable by the disassembly. The exposed pintle or center pin on the crawler assembly shall be protected from damage by a wood housing secured in place with strapping or bolts. Strapping shall be as specified in

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3.4.1.1.1. Each assembly, all packed and unpacked components, and the attachments comprising a complete unit, shall be shipped together on one or more transportation carriers as required.

3.4.1.3 Attachments.

3.4.1.3.1 Bundling. Unless otherwise specified (see 3.4.1.3.6 and 3.4.1.3.6.1), each shovel front, backhoe, and piledriver leads with catwalks but without dippers, buckets, and hammers shall be packed as individual bundles. The disassembled components comprising each attachment shall be nested and arranged to form a compact bundle similar to those shown on figures 1 through 10. Figures 1 through 10 shall be used as a guide for the location of fastening brackets and additional fastening and blocking of the components in the bundle. Brackets shall be fabricated from a weldable grade of carbon steel, carbon content not exceeding 0.25; or from a weldable grade of alloy steel, carbon content not exceeding 0.25. The steel stock shall be not less than 1/4-inch thick and 1-1/2-inches wide. The fastening brackets shall be located on the components on other than critical machined surfaces. The fastening brackets shall be secured to the components with tack welds. Each weld shall be approximately 3/4-inch long, and there shall be not less than six tack welds to each bracket. When required to insure a safe bundle, additional fastenings shall be applied using strapping. Strapping shall be as specified in 3.4.1.1.1. Attached brackets and tack welds shall be cleaned and painted the same color as the attachment to which attached in accordance with the painting requirements of the equipment specification. The words "REMOVE FASTENING BRACKETS WITH CHISEL" shall be stenciled on each bundle in one or more conspicuous locations near the brackets. Stenciling shall be in 1/2-inch letters using white lusterless enamel and shall be overcoated, after drying, with varnish conforming to TT-V-121. Repair parts and component parts groups for each attachment, consolidated packed as specified in 3.3.1.41.3 and 3.3.1.41.4, shall be secured to the top side of the bundle with strapping specified herein.

3.4.1.3.2 Crane booms and catwalks. Unless otherwise specified (see 3.4.1.3.6 and 3.4.1.3.6.1), crane booms and catwalks shall be shipped loose as individual sections. The repair parts and component parts groups for each crane boom or catwalk, consolidated packed as specified in 3.3.1.41.3 and 3.3.1.41.4, shall be shipped separate from but at the same time as the crane boom and catwalk. When specified (see 6.2), telescopic crane booms shall be retracted and shipped in their normal transportation position on the crane and shall be secured to prevent movement or damage during shipment.

3.4.1.3.3 Hammers. Unless otherwise specified (see 3.4.1.3.6 and 3.4.1.3.6.1), piledriver hammers shall be shipped as loose items. Any related parts shall be secured to the hammer with strapping. Strapping be as specified in 3.4.1.1.1.

3.4.1.3.4 Dippers and buckets. Unless otherwise specified (see 3.4.1.3.6 and 3.4.1.3.6.1), shovel and backhoe dippers and clamshell, concrete and dragline buckets shall be shipped as loose items. Repair parts and component parts groups for each dipper or bucket, consolidated packed as specified in 3.3.1.41.3 and 3.3.1.41.4, and any other component of the dippers and buckets shall be placed inside the respective dipper or bucket and secured with blocking, bracing and strapping. Strapping shall be as specified in 3.4.1.1.1.

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3.4.1.3.5 Hook blocks. Unless otherwise specified (see 3.4.1.3.6 and 3.4.1.3.6.1), hook blocks shall be shipped as loose items. When specified (see 6.2), hook blocks, not exceeding 1,000 pounds, for attachments shipped as loose items, bundled items, or as boxed items, shall be packed in close-fitting boxes conforming to PPP-B-601, overseas type, style optional or PPP-B-621, class 2, style optional. Hook blocks, exceeding 1,000 pounds for attachments shipped as loose items, bundled items, or as boxed items, shall be packed in a crate conforming to MIL-C-104, type I, class 1 or 2, style a. Blocking, bracing, and anchoring shall be in accordance with the crate specification and MIL-STD-1186. The blocks, either as loose items or as boxed items, shall be shipped separately from but at the same time as the related attachments.

3.4.1.3.6 Boxed attachments. When specified (see 6.2), components comprising each shovel front, backhoe, piledriver lead, piledriver hammer, catwalk, and crane boom sections including hook blocks, wire rope, repair parts, and the consolidated packed component parts group for the attachment, shall be packed in a crate conforming to MIL-C-104, type I, class 1 or 2, style a. Blocking, bracing, and anchoring shall be in accordance with MIL-C-104 and MIL-STD-1186. Strapping shall be as specified in 3.4.1.1.1. Dippers and buckets for boxed attachments shall be packed as loose items specified in 3.4.1.3.4.

3.4.1.3.6.1 Consolidation. When specified (see 6.2), two or more complete attachments shall be packed together as specified in 3.4.1.3.6.

3.4.2 Level B. The cranes, crane-shovels, attachments, repair parts, tools, publications, and component parts groups for attachments shall be packed as specified for level A, except boxes shall be domestic type and class, and crates for boxed attachments and hook blocks shall conform to MIL-C-3774, type I, style A. Strapping is not required to be zinc-coated.

3.4.3 Level C. The cranes, crane-shovels, attachments, repair parts, tools, publications, and component part groups for attachments shall be packed to assure carrier acceptance and safe delivery to destination at lowest ratings in compliance with Uniform Freight Classification rules or National Motor Freight Classification rules.

3.5 Marking. In addition to any special marking specified in the contract or purchase order (see 6.2), marking shall be in accordance with MIL-STD-129.

3.6 Depreservation guide. Two depreservation guides shall be prepared. Each guide shall be placed in a waterproof envelope marked "Depreservation Guide". One copy shall be attached to the operator controls. The other copy shall be placed in the pack of technical manuals and the pack marked to show that the depreservation guide is inside. Unless otherwise specified (see 6.2), DA Form 2258 - "Depreservation Guide for Vehicles and Equipment" shall be used (see 6.6).

3.7 Workmanship. All operations and processes involved in accomplishing the cleaning, preserving, unit packing, packing, and marking requirements specified herein shall be in accordance with the highest grade practices associated with this type of work. Materials used shall be free of defects.

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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 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 the 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. 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 acceptance of defective material.

4.1.2 Material inspection. The contractor is responsible for insuring that supplies and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards.

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

- a. First article pack inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article pack inspection.

4.3.1 Examination. The first article pack shall be examined for the defects specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.2 Test. The first article pack of boxed or bundled attachments for level A or B shall be tested as follows: The crated and bundled attachments shall be subjected to the railroad-car test as specified for guided impact tests in accordance with MIL-STD-1186, appendix A. The car shall strike a string of five empty cars, with draft gear extended and the brakes set, at a speed of not less than 10 miles per hour nor greater than 11 miles per hour. Shifting of contents, loosening of holdowns, ties, stays, blocking, or bracing, or any visible damage to the attachments shall constitute failure of this test and shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Unit of product. For the purpose of inspection, a completed pack of any one level shall be considered a unit of product.

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4.4.2 Sampling. Sampling for examination shall be in accordance with MIL-STD-105.

4.4.3 Examination. Samples selected in accordance with 4.4.2 shall be examined for the defects marked "X" for the applicable level in table I. One or more defects shall be cause for rejection.

4.5 Inspection procedure.

4.5.1 Examination. Packs shall be examined for the following defects:

TABLE I. Classification of defects.

No.	Defect	Level		
		A	B	C
101.	Materials, methods, or containers not as specified. Each incorrect material, method, or container shall constitute one defect (see 3.2, 3.3, and 3.4).	X	X	-
102.	Disassembly not as specified (see 3.3.1.1 and 3.3.2.1).	X	X	-
103.	Removed bolts, nuts, screws, pins, and washers not reinstalled in mating parts and not secured as specified (see 3.3.1.1 and 3.3.2.1).	X	X	-
104.	Keys not secured in keyways as specified (see 3.3.1.1 and 3.3.2.1).	X	X	-
105.	Matchmarking not as specified (see 3.3.1.2 and 3.3.2.1).	X	X	-
106.	Ink used for matchmarking tags not waterproof as specified (see 3.3.1.2).	X	-	-
107.	Damaged portions of painted surfaces not repainted as specified (see 3.3.1.4).	X	-	-
108.	Unprotected metal surfaces not coated with preservatives as specified (see 3.3.1.5 and 3.3.2.3).	X	X	-
109.	Preserved machined surfaces not wrapped or covered with barrier material and the wraps or covers not secured with tape as specified (see 3.3.1.5 and 3.3.2.3).	X	X	-
110.	Unpainted metal information plates not coated with varnish as specified (see 3.3.1.5).	X	-	-
111.	Engine and engine accessories not preserved as specified (see 3.3.1.6 and 3.3.2.4).	X	X	-
112.	Interior surfaces of priming pumps not coated with preservative as specified and unpainted exterior surfaces not coated with varnish as specified (see 3.3.1.6.1.1 and 3.3.2.10).	X	X	-
113.	Surfaces of pressure-priming dischargers not coated with preservatives as specified (see 3.3.1.6.1.2 and 3.3.2.10).	X	X	-
114.	Cap not sealed to discharger body with tape as specified (see 3.3.1.6.1.2 and 3.3.2.10).	X	X	-
115.	Unpainted surfaces of burners not coated with preservative as specified (see 3.3.1.6.1.3 and 3.3.2.10).	X	X	-
116.	Openings into burners not sealed with tape as specified (see 3.3.1.6.1.3 and 3.3.2.10).	X	X	-
117.	Fuel tanks, drainplugs, and fill caps not coated with preservative as specified (see 3.3.1.6.1.4 and 3.3.2.10).	X	X	-

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TABLE I. Classification of defects. (continued)

No.	Defect	Level		
		A	B	C
118.	Electric motors not preserved as specified (see 3.3.1.6.1.5 and 3.3.2.10).	X	X	-
119.	Blowtorches and blowtorch-type burners not coated with preservative and not packed as specified (see 3.3.1.6.1.6 and 3.3.2.10).	X	X	-
120.	Unprotected and unpainted surfaces of drive shafts and universal joints not coated with preservative as specified (see 3.3.1.7).	X	-	-
121.	Dust boots not reinstalled on drive shafts and universal joints (see 3.3.1.7).	X	-	-
122.	Exposed gears not coated with preservative or with primer as specified (see 3.3.1.8.1 and 3.3.2.8).	X	X	-
123.	Enclosed gears not preserved and tagged as specified or not filled with applicable grade of lubricant and tagged as specified (see 3.3.1.8.2 and 3.3.2.5).	X	X	-
124.	Exposed drive chains not coated with preservative as specified (see 3.3.1.9.1 and 3.3.2.9).	X	X	-
125.	Disc-type clutch components not coated as specified and not secured in partially disengaged position as specified (see 3.3.1.10.1 and 3.3.2.6.1).	X	X	-
126.	Band and shoe-type clutches not preserved as specified (see 3.3.1.10.2).	X	-	-
127.	Cone-type clutches not preserved as specified (see 3.3.1.10.3).	X	-	-
128.	Jaw-type clutches not preserved as specified (see 3.3.1.10.4).	X	-	-
129.	Flywheel clutches not preserved and tagged as specified or not filled with applicable grade of lubricant and tagged as specified (see 3.3.1.10.5, 3.3.1.10.6, and 3.3.2.6.2).	X	X	-
130.	Steering clutches not preserved and not tagged as specified (see 3.3.1.10.7.1, 3.3.1.10.7.2, and 3.3.2.6.2).	X	X	-
131.	Hydraulic boosters not preserved and not tagged as specified (see 3.3.1.10.7.3 and 3.3.2.6.2).	X	X	-
132.	Brakes not preserved in general as specified (see 3.3.1.11.1).	X	-	-
133.	Hydraulic brake systems not preserved and not tagged as specified (see 3.3.1.11.2.1, 3.3.1.11.2.2, and 3.3.2.11).	X	X	-
134.	Air-actuated brake systems not preserved and tagged as specified (see 3.3.1.11.3).	X	-	-
135.	Air hydraulic brakes not preserved and not tagged as specified (see 3.3.1.11.4 and 3.3.2.11).	X	X	-
136.	Vacuum brake system pumps not preserved, sealed, and tagged as specified (see 3.3.1.12.1).	X	-	-
137.	Vacuum brake system components not coated with preservative as specified (see 3.3.1.12.2 and 3.3.1.12.3).	X	-	-
138.	Hydraulic systems not preserved, not wrapped, and the controls not secured in neutral position as specified (see 3.3.1.13 and 3.3.2.11).	X	X	-

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TABLE I. Classification of defects. (continued)

No.	Defect	Level		
		A	B	C
139.	Automatic transmissions, fluid couplings, and torque converters not preserved and tagged as specified or not filled with the applicable type of lubricant and tagged as specified (see 3.3.1.14.1, 3.3.1.14.2.1, 3.3.1.14.2.2, and 3.3.2.7).	X	X	-
140.	Linkage not preserved and lubricated as specified (see 3.3.1.15).	X	-	-
141.	Wheels, axles, and bearings not preserved as specified (see 3.3.1.16).	X	-	-
142.	Rubber tires not inflated to pressure-value recommended (see 3.3.1.17 and 3.3.2.17).	X	X	-
143.	Crawler components not coated with preservatives as specified (see 3.3.1.18).	X	-	-
144.	Instrument panels not protected as specified (see 3.3.1.19 and 3.3.2.13).	X	X	-
145.	Lamps, reflectors, and rear-vision mirrors not packed or not protected as specified (see 3.3.1.20 and 3.3.2.12).	X	X	-
146.	Gearshifts, control levers, and composition or rubber hand-grips not preserved as specified (see 3.3.1.21).	X	-	-
147.	Drivebelts not removed and packed as specified or not released from tension as specified (see 3.3.1.22 and 3.3.2.4).	X	X	-
148.	Pulley grooves not coated with primer as specified (see 3.3.1.22).	X	-	-
149.	Seat backs, armrests, cushions, and floormats not protected as specified (see 3.3.1.23 and 3.3.2.14).	X	X	-
150.	Windshield wiper arms and blades not removed, not packed, not placed in toolbox, and wiper shafts not coated with preservatives as specified (see 3.3.1.24 and 3.3.2.16).	X	X	-
151.	Interior of locks not coated with graphite as specified (see 3.3.1.25).	X	-	-
152.	Openings into exterior locks not sealed with tape as specified (see 3.3.1.25).	X	-	-
153.	Padlocks and keys not placed in toolbox as specified (see 3.3.1.25 and 3.3.2.15).	X	X	-
154.	Tag indicating location of keys not provided and ink not waterproof as specified (see 3.3.1.25).	X	-	-
155.	Hinges and metal fasteners not coated with preservative as specified (see 3.3.1.26).	X	-	-
156.	Engine hoods not closed and secured as specified (see 3.3.1.27).	X	-	-
157.	Unpainted surfaces of outriggers not coated with preservative as specified (see 3.3.1.28).	X	-	-
158.	Telescoping or swing beams not retracted and secured as specified (see 3.3.1.28).	X	-	-
159.	Wire rope not preserved and rewound on drums or not coiled and the coils identified as specified (see 3.3.1.31).	X	-	-
160.	Electric wiring systems not protected as specified (see 3.3.1.32).	X	-	-

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TABLE I. Classification of defects. (continued)

No.	Defect	Level		
		A	B	C
161.	Soft tops not removed and packed as specified (see 3.3.1.33).	X	-	-
162.	Windows of soft-top trucks not rolled down and the opening for the window and guide not sealed with tape as specified (see 3.3.1.33).	X	-	-
163.	Boom angle indicator not coated with preservative and not protected as specified (see 3.3.1.34).	X	-	-
164.	Interior surfaces of piledriver hammers not coated with preservative as specified (see 3.3.1.35).	X	-	-
165.	Exposed surfaces of ramshafts on piledriver hammers not coated with preservative and not covered with barrier material as specified (see 3.3.1.35).	X	-	-
166.	Fire extinguishers not preserved and not packed as specified (see 3.3.1.37 and 3.3.2.18).	X	X	-
167.	Consolidation not as specified (see 3.3.1.41.1 through 3.3.1.41.4 and 3.3.2.20).	X	X	-
168.	Strapping on consolidated containers not zinc-coated as specified (see 3.3.1.41.1 through 3.3.1.41.4).	X	-	-
169.	Packing not as specified (see 3.4.1.2 through 3.4.3).	X	X	X
170.	Marking illegible, incomplete, incorrect, or missing (see 3.5).	X	X	X
171.	Depreservation guide not prepared and attached as specified (see 3.6).	X	X	-
172.	Workmanship not as specified (see 3.7).	X	X	X

5. PACKAGING

(This section not applicable to this specification.)

6. NOTES

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

6.1 Intended use. It is intended that this specification to be used for reference in section 5 of equipment specifications, for direct references in contracts or orders, or in the preservation of packaging data sheets.

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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 and 2.2).
- c. Time frame required for submittal of first article pack (see 3.1).
- d. Level of preservation and packing required (see 3.3 and 3.4).
- e. When disassembly of the clutch is required (see 3.3.1.10.1 and 3.3.1.10.7.1).
- f. When internal surfaces of the brakes and brakedrums are not required to be coated with primer (see 3.3.1.11.1).
- g. When lamps, reflectors, and mirrors are to be covered (see 3.3.1.20).
- h. When MIL-S-196 is to be used for preservation of repair parts (see 3.3.1.40 and 3.3.2.19).
- i. When glass windows and windshields are required to be protected (see 3.4.1.2.1).
- j. When booms are to be shipped installed on the crane (see 3.4.1.3.2).
- k. When hook blocks are to be boxed (see 3.4.1.3.5).
- l. When attachments are to be boxed (see 3.4.1.3.6).
- m. When consolidation of attachments is required (see 3.4.1.3.6.1).
- n. Any special marking required (see 3.5).
- o. When other than DA Form 2258 is to be used (see 3.6).

6.3 First article pack. Any changes or deviations of production packs from the approved first article pack will be subject to the approval of the contracting officer. Approval of the first article pack will not relieve the contractor of his obligation to preserve, pack, and mark the equipment and attachments in accordance with this specification.

6.4 Repainting. The requirements of 3.3.1.4 are intended to apply only in those cases where the painting requirements of the equipment specification would not otherwise be applicable such as on separate packaging contracts or in depot operations.

6.5 Fuel oil contained in preservative oil. The percentage of fuel oil contained in preservative oil which has been used to preserve burner fuel tanks and torque conversion transmissions (see 3.3.1.6.1.4, 3.3.1.14.2.2, and 3.3.2.7) may be determined within practical limits by use of American Petroleum Institute hydrometers and control specimens of known dilution.

6.6 Depreservation guide. The contracting officer should arrange to furnish the necessary copies of DA Form 2258, when requested by the contractor (see 3.6).

6.7 Environmental pollution prevention. Environmental pollution prevention is contained in the material specifications specified herein. Refer to the material specifications (or preparing activity) for recommended disposal methods.

6.8 Subject term (key word) listing.

Marking
Packing
Preservation

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6.9 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.

Custodians:

Army - ME
Navy - YD
Air Force - .99

Preparing activity:

Army - ME

Project 3810-0107

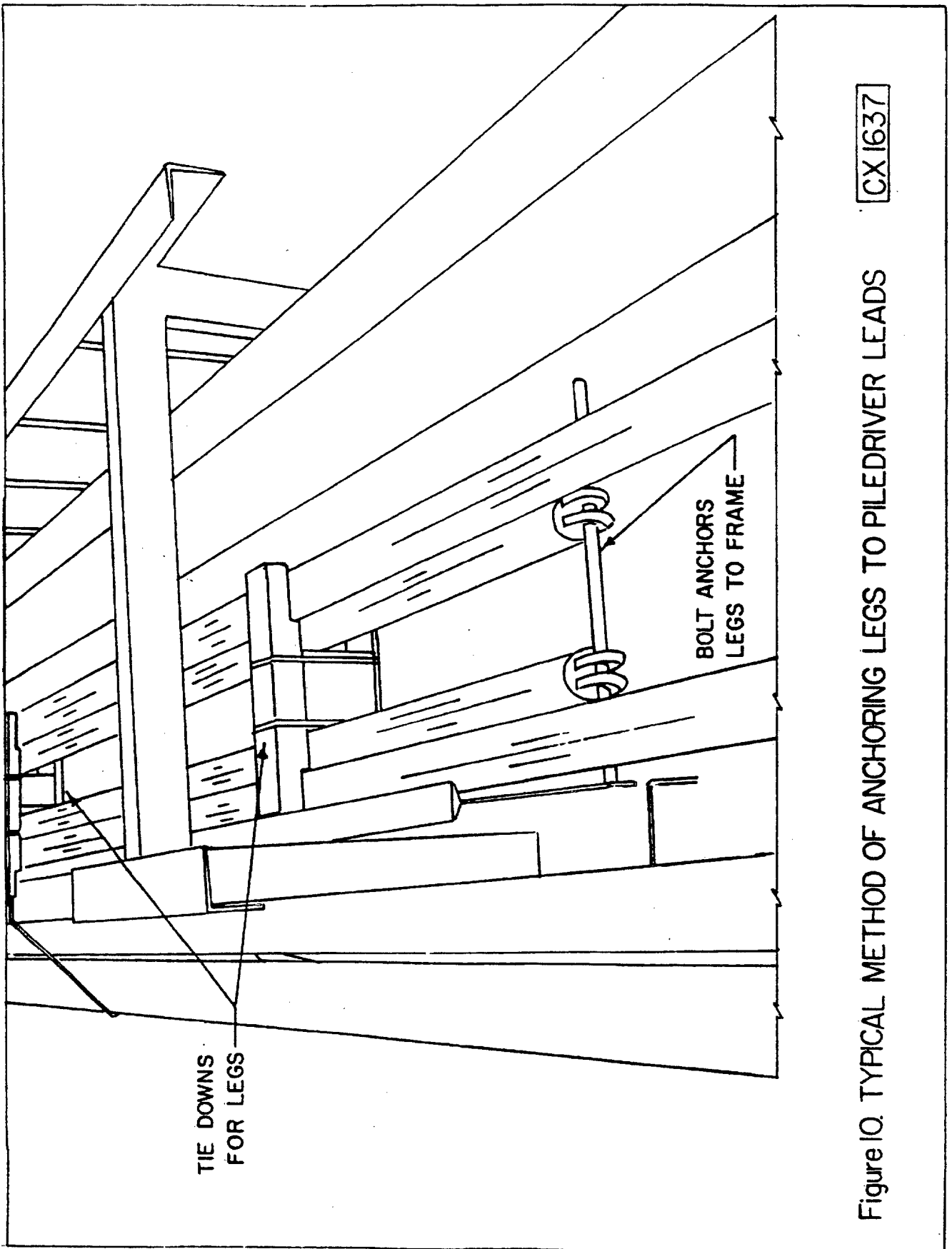
Review activities:

Army - AT, SM
Air Force - 84

User activities:

Navy - MC

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CX 1637

Figure 10. TYPICAL METHOD OF ANCHORING LEGS TO PILEDRIVER LEADS

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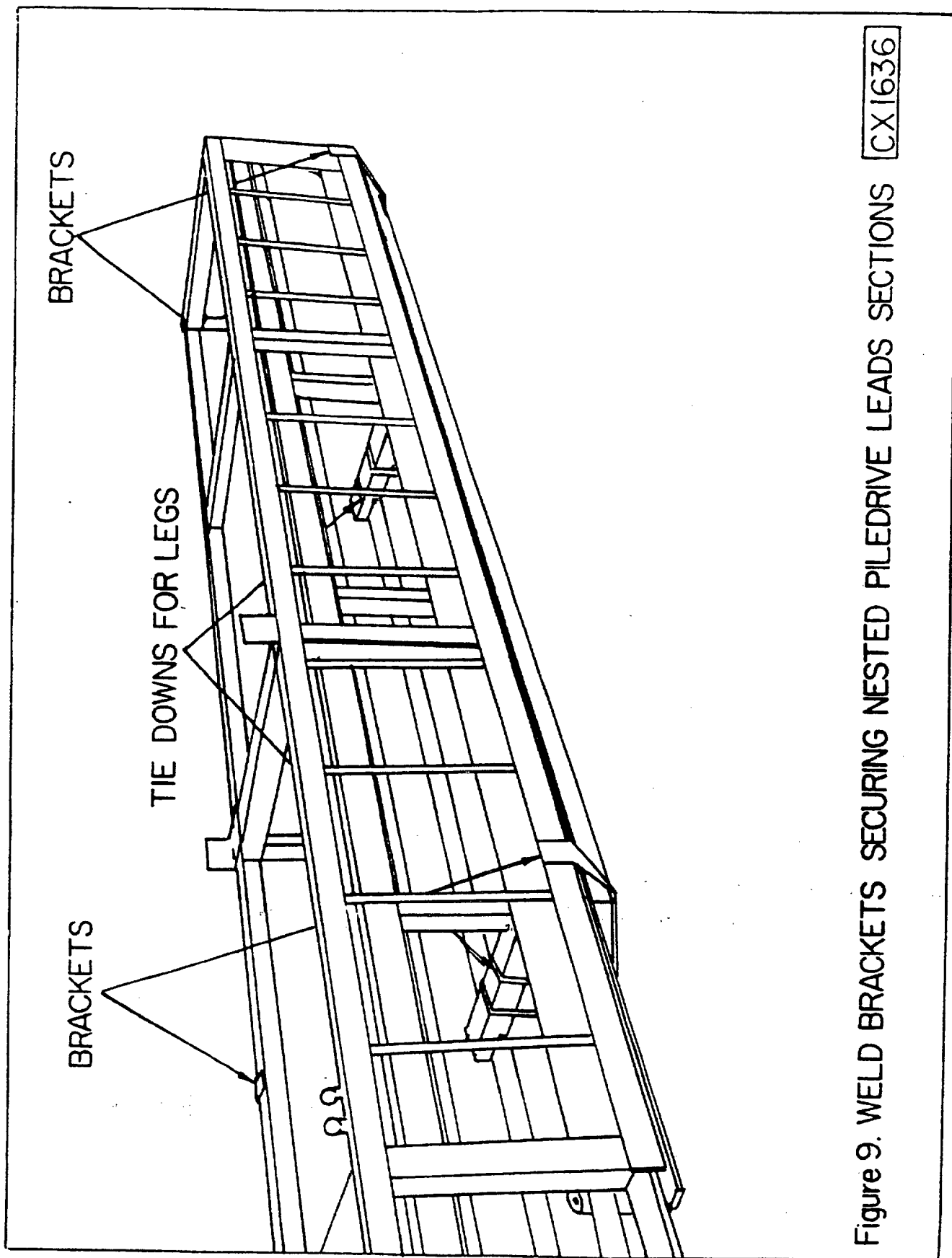
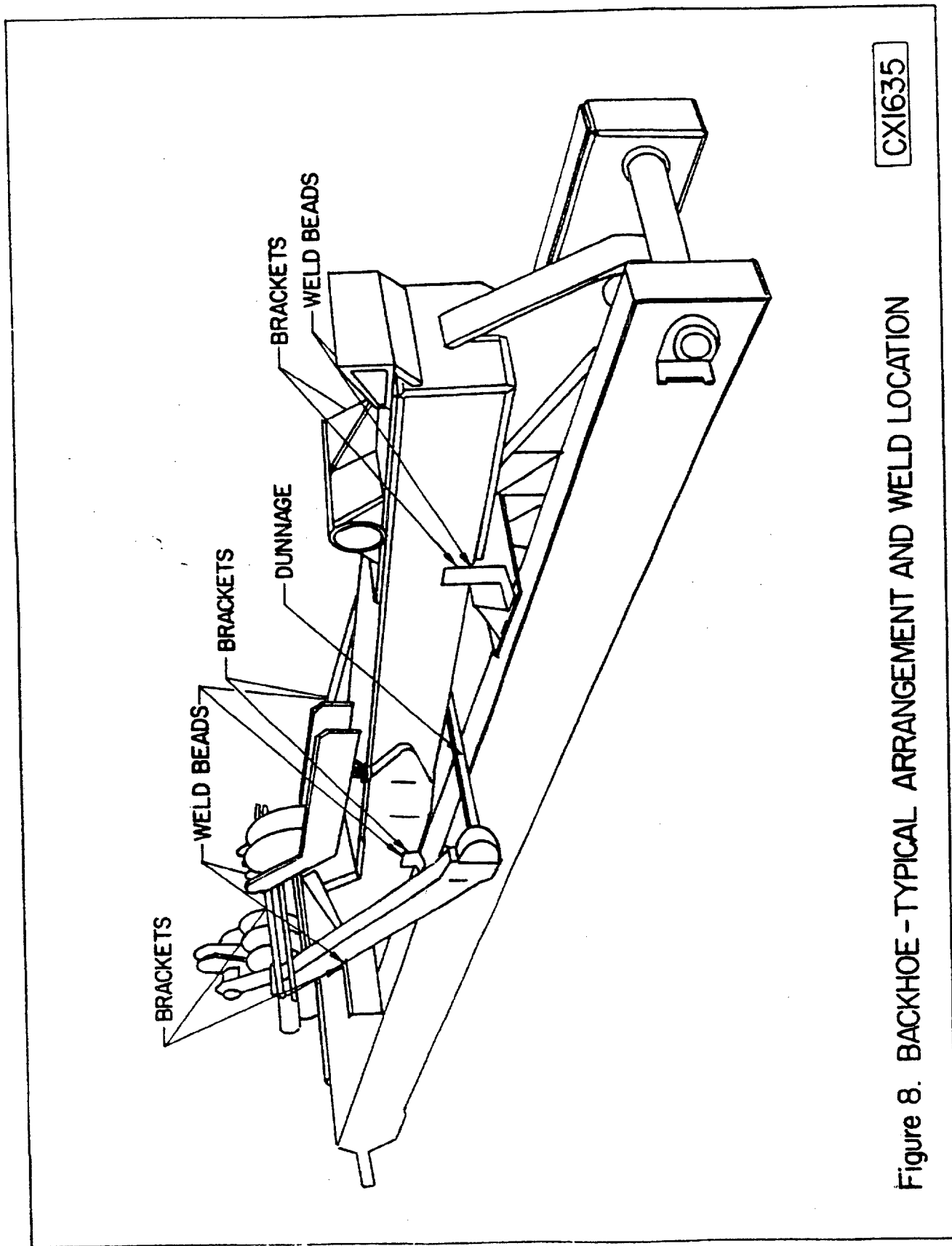


Figure 9. WELD BRACKETS SECURING NESTED PILEDRIVE LEADS SECTIONS [CX1636]

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CX1635

Figure 8. BACKHOE - TYPICAL ARRANGEMENT AND WELD LOCATION

CX1634

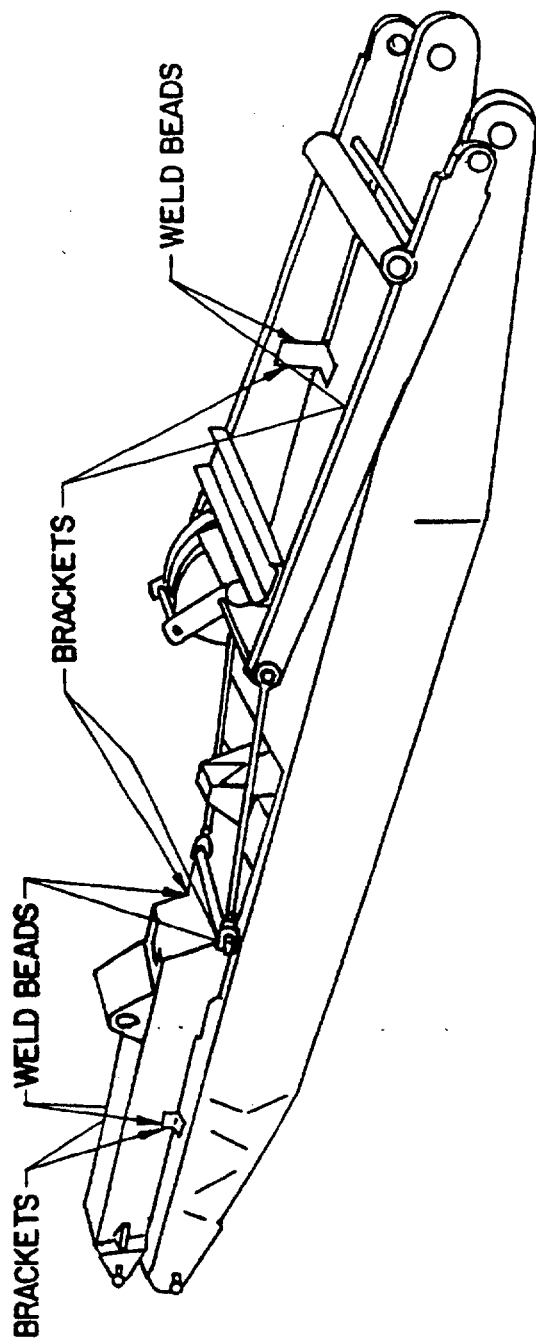
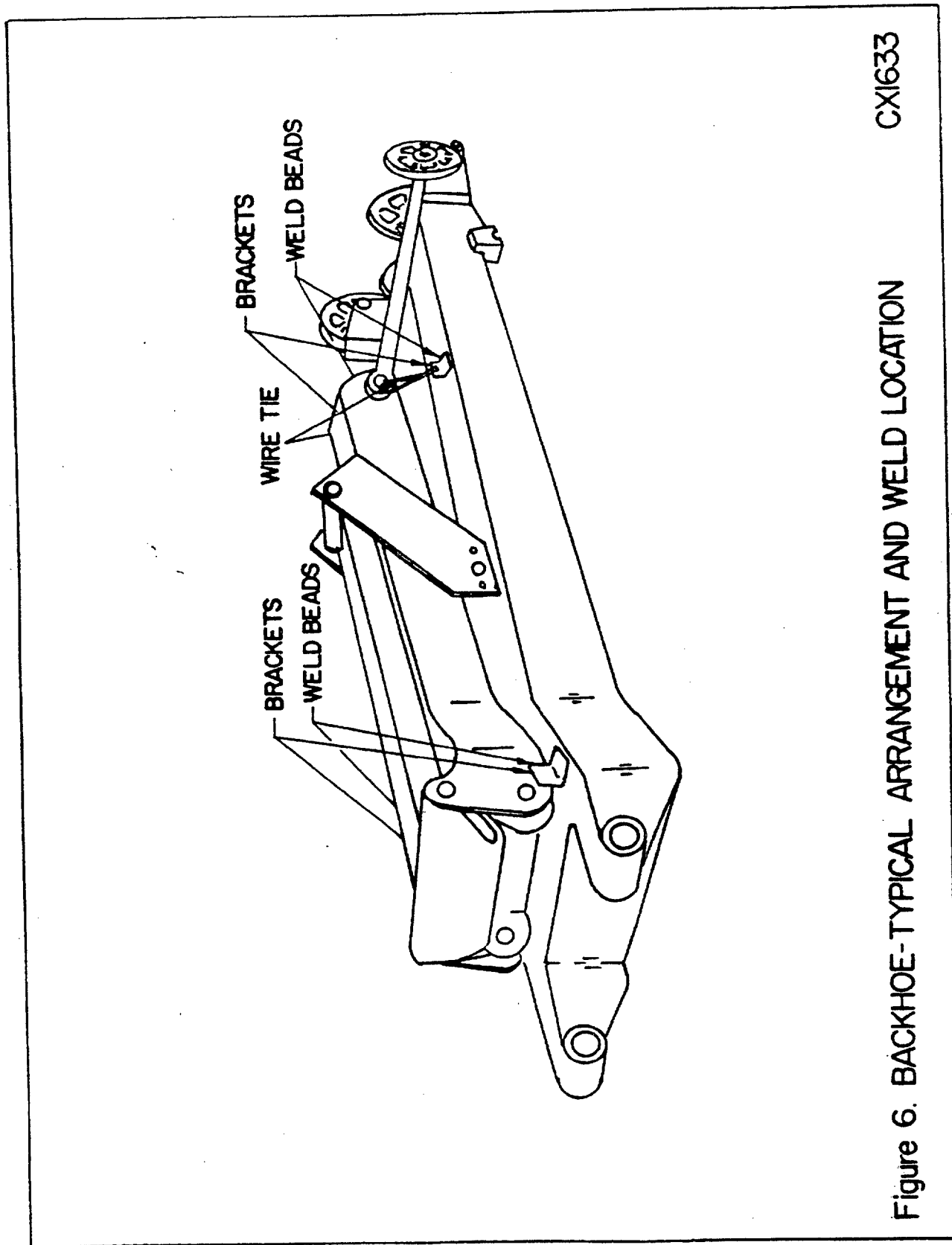


Figure 7. BACKHOE-TYPICAL ARRANGEMENT AND WELD LOCATIONS

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CX1633

Figure 6. BACKHOE-TYPICAL ARRANGEMENT AND WELD LOCATION

MIL-C-3580E

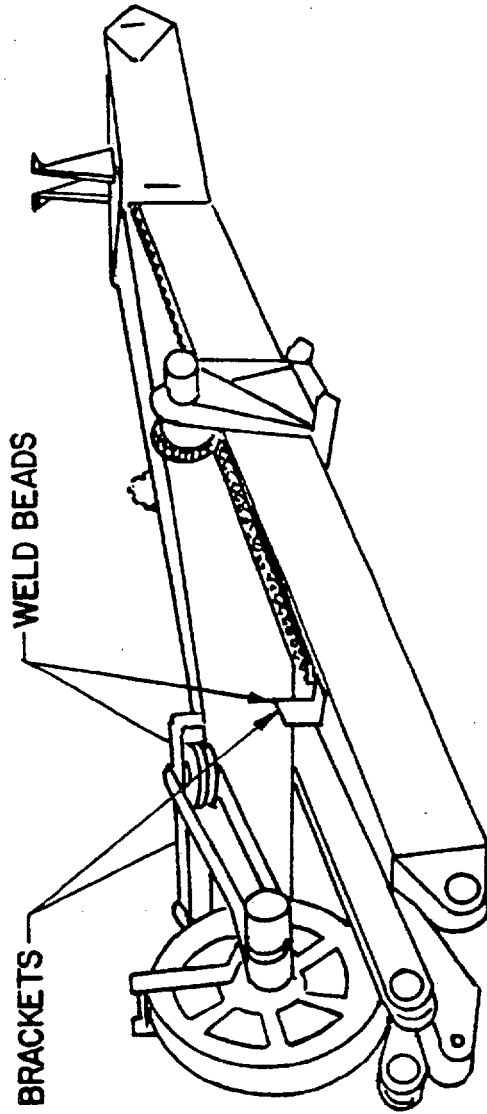
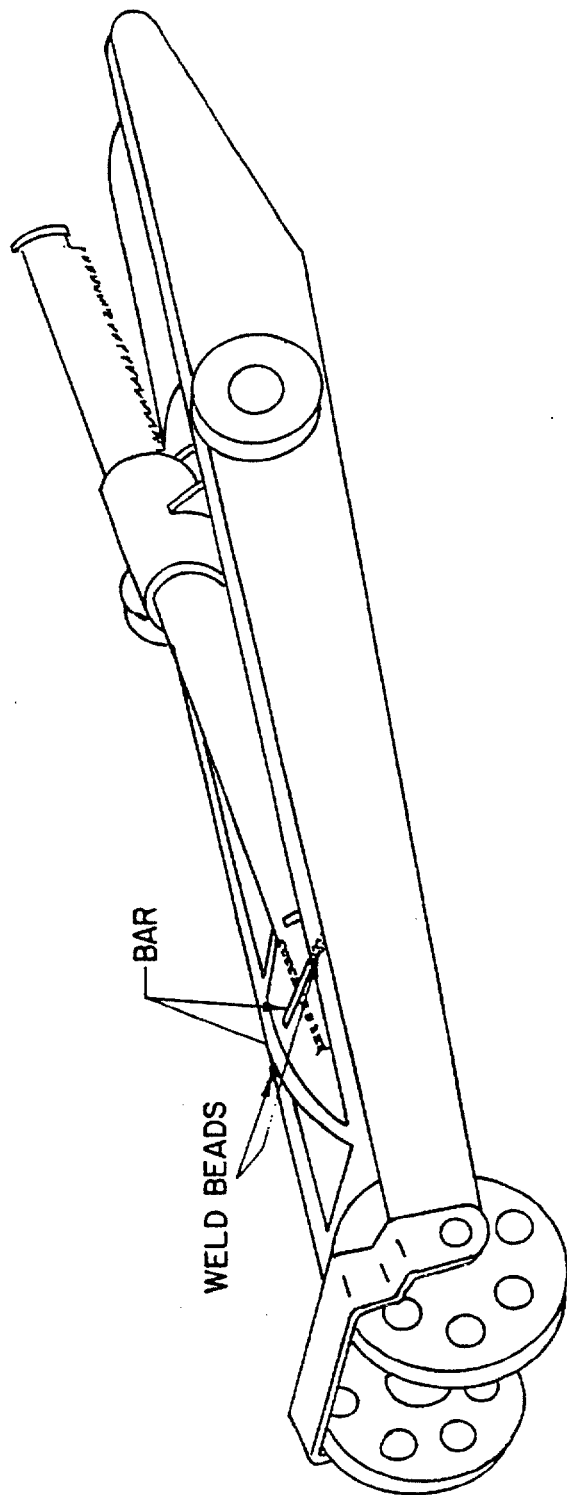


Figure 5. SHOVEL FRONT-TYPICAL ARRANGEMENT AND WELD LOCATION [CX1632]

MIL-C-3580E



CX1631

Figure 4. SHOVEL FRONT-TYPICAL ARRANGEMENT AND WELD LOCATIONS

CX1630

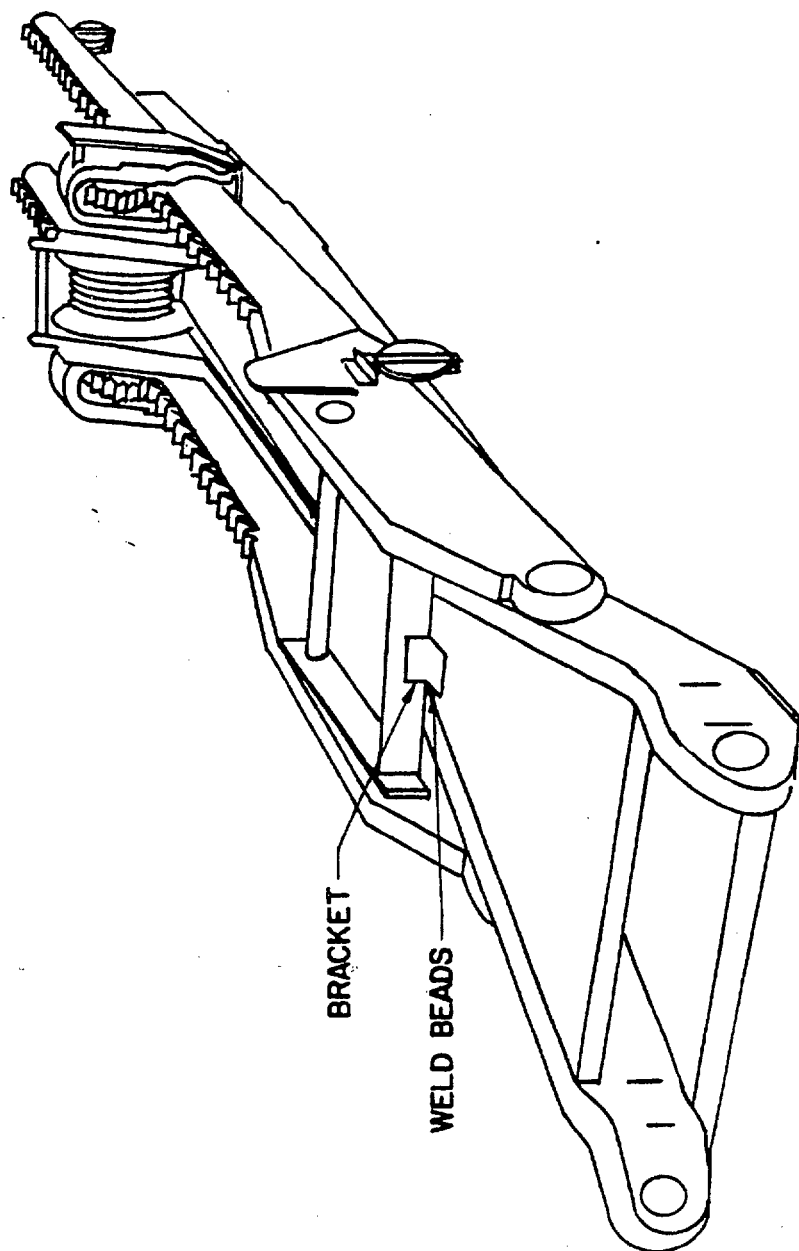


Figure 3. SHOVEL FRONT-TYPICAL ARRANGEMENT AND WELD LOCATIONS

MIL-C-3580E

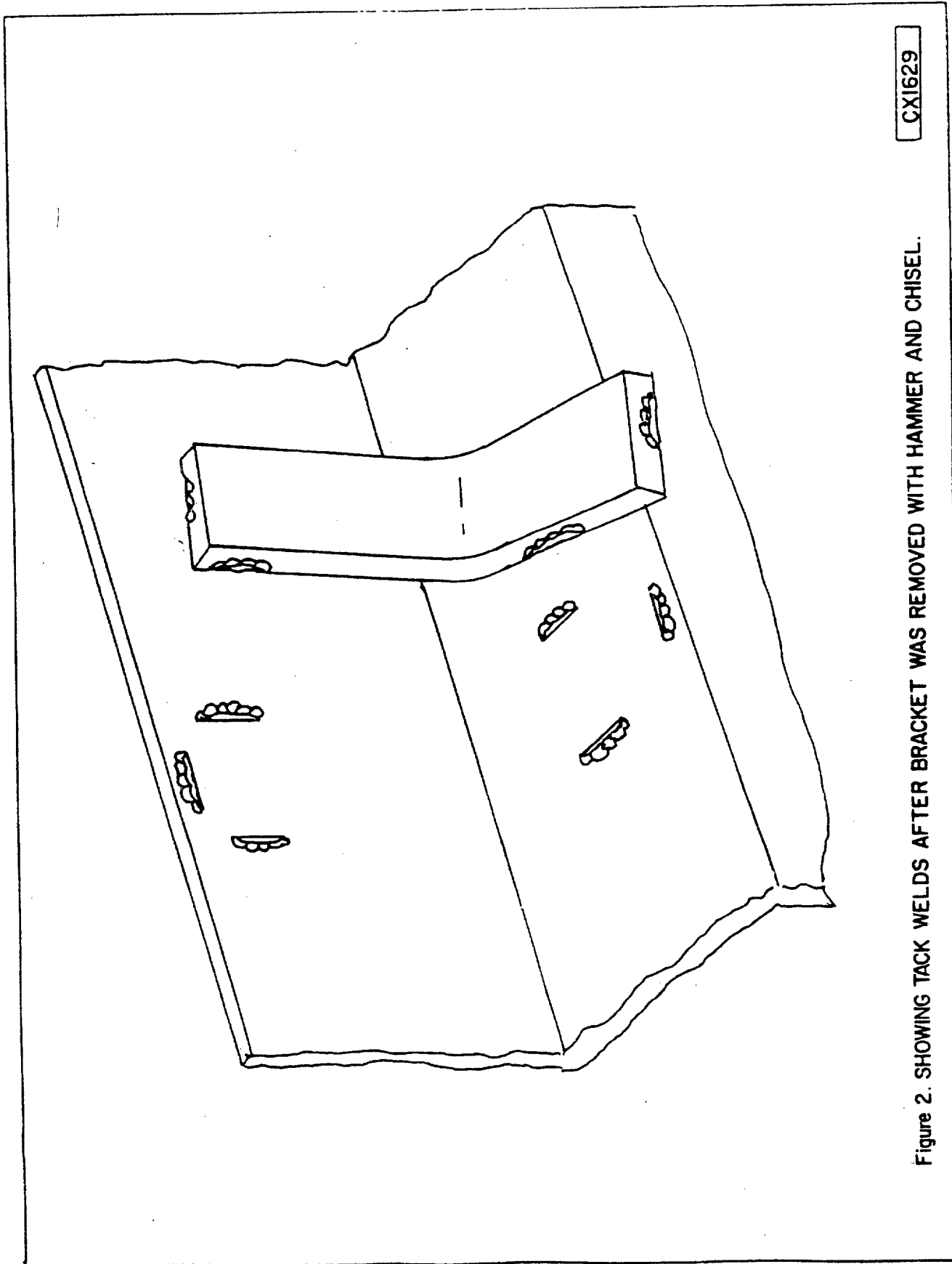


Figure 2. SHOWING TACK WELDS AFTER BRACKET WAS REMOVED WITH HAMMER AND CHISEL.

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CX1628

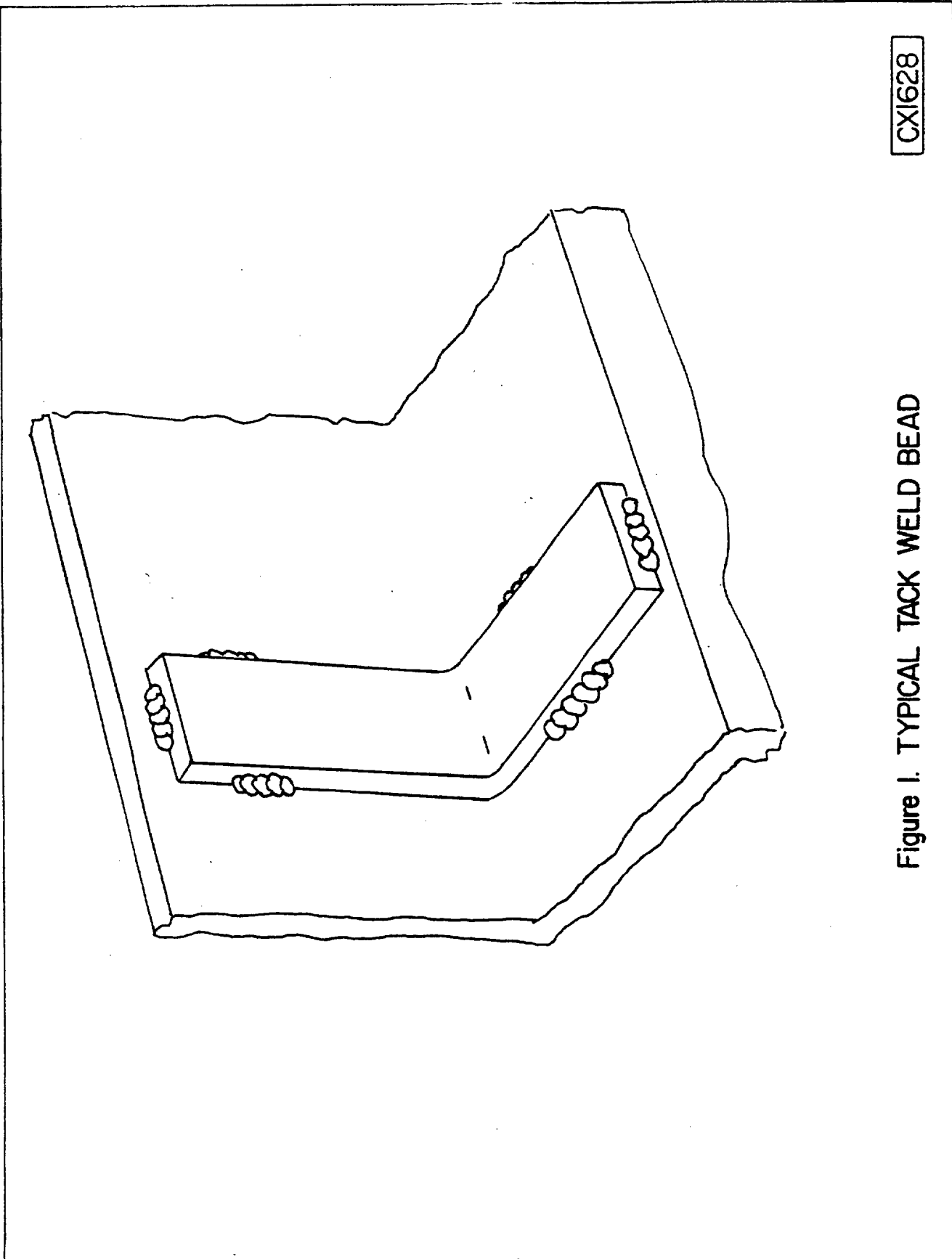


Figure 1. TYPICAL TACK WELD BEAD

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.

RECOMMEND A CHANGE	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-C-3580E	910115
3. DOCUMENT TITLE Crane and Crane-Shovel, Truck, Crawler and Wheel Mounted, Full-Revolving, and Their Attachments, Packaging Of		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		

5. REASON FOR RECOMMENDATION

SUBMITTER'S NAME		ORGANIZATION	
ADDRESS (Include Zip Code)		TELEPHONE (Include Area Code)	DATE SUBMITTED (YYMMDD)
		(1) Commercial	
		(2) AUTOVON (If applicable)	

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (Include Area Code)
	(1) Commercial (2) AUTOVON
	(703) 664-5717 354-5717
c. ADDRESS (Include Zip Code)	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
US Army Belvoir RDE Center	Defense Quality and Standardization Office
ATTN: STRBE-TSE	5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466
Ft. Belvoir, VA 22060-5606	Telephone (703) 756-2340 AUTOVON 289-2340