Inch-Pound

MIL-PRF-23199/1 (SH)
Revision B
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Superseding
MIL-PRF-23199/1(SH)
Revision A
28 February 2003

PERFORMANCE SPECIFICATION
PACKAGING, PACKING AND MARKING (PP&M) REQUIREMENTS FOR INSTRUMENTATION AND CONTROL EQUIPMENT

This specification is approved for use by the Naval Sea Systems Command (NAVSEA), Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

CHANGES FROM PREVIOUS ISSUE – THE OUTSIDE MARGINS OF THIS DOCUMENT ARE MARKED WITH ASTERIKS (OR VERTICAL LINES) TO INDICATE WHERE CHANGES FROM THE PREVIOUS ISSUE WERE MADE. THIS WAS DONE AS A CONVEINENIENCE ONLY, AND THE GOVERNMENT ASSUMES NO LIABILITY FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT REGARDLESS OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

1. SCOPE

1.1 Scope. This specification covers the requirements for packaging, packing, and marking of Instrumentation and Control components to safeguard cleanliness, prevent damage and corrosion, and preserve identification during shipment and storage.

1.2 Definitions:

CCA	Circuit Card Assembly
DOT	Department of Transportation
ESD	Electro-Static Discharge
F/C	Field Change
GBL	Government Bill of Lading
GPA	Government Procurement Agency
INSSRP	Initial Navy Supply System Repair Parts
INS	Initial Navy Stock
Marking	Marking, as used in this specification refers to marking and labeling of packaging and packing.
MBB	Moisture Barrier Bags

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems command, Attn: SEA 05Q, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376 or e-mailed to commandstandards@navy.mil with the subject line "Document Comment". Since contracting information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil or http://assist.daps.dla.mil/quicksearch/.

AMSC N/A PACK-2010-008

NSN	National Stock Number
OBRP	On-Board Repair Parts
OBS	On-Board Spares
PEM	Plastic Encapsulated Microcircuit
PP&M	Packaging, Packing and Marking
PWA	Printed Wiring Assembly
SMD	Surface Mount Device
SLL	Shipyard Load List
TCN	Transportation Control Number
WVTR	Water Vapor Transmission Rate

1.3 Field Service. Unless otherwise specified or requested by the Government Procurement Agency (***GPA***), the requirements contained herein do not apply to materials or equipment that is hand carried by supplier field service personnel. The Seller field service personnel are responsible for protecting and handling the hand carried items. Materials and equipment that is shipped separately in support of field service is required to be packaged, packed and marked in accordance with this specification.

1.3.1 Shipment in Place. Unless otherwise specified or requested by the ***GPA***, the requirements contained herein do not apply to items where the ***GPA*** has authorized shipment in place. In such cases, the Seller is responsible for storing, protecting and maintaining the identification of the items until the ***GPA*** has authorized shipment to final destination. Items shipped in place are considered Government Furnished Equipment (GFE) and shall be controlled as such in accordance with Seller procedures for control of GFE. The requirements specified herein apply for shipment to final destination.

1.4 PP&M Procedures: Seller PP&M procedures written in accordance with the requirements contained herein are subject to ***GPA*** on-site review. The Seller may also submit the procedure via the Coordinated Procedure Review System (CPRS). Alternatively, the Seller may develop a facility based PP&M plan that describes, in general terms, the methods to be used for PP&M. The plan must document compliance with the requirements specified herein. If this method is chosen, PP&M details such as lumber size, etc. may be implemented in Seller work instructions. Such details and the overall plan shall be made available to the ***GPA*** for on-site review upon request. Deviations from this specification may be authorized by the ***GPA*** on a case basis (i.e., Alternate packaging methods may be authorized when the packaged equipment is intended for near term installation and long term preservation is not required, or otherwise when considered acceptable by the ***GPA***.) When the *GPA* authorizes commercial packaging, ASTM D 3951 should be used as a guideline. However, the Seller remains responsible to safeguard cleanliness, prevent damage (including electro-static and moisture protection if required) and preserve identification during shipment. The use of "loose fill" cushioning is prohibited and all marking requirements identified in this specification remain in effect.

1.4.1 Loading and Blocking The Seller shall prepare a procedure providing the minimum requirements for loading and blocking of each equipment type. One generic facility wide plan is acceptable. Loading and blocking requirements shall apply for all equipment packaged in accordance with 3.2.1 or 3.2.2. The procedure shall be made available for *GPA* on-site review. All shipments shall be made in closed trailers. Loading and blocking shall be in accordance with DOT CFR Title 49 392.9 (Safe Loading), 393.1000 (General rules for protection against shifting or falling cargo), 393.102 (Securement systems), and 393.104 (Blocking and bracing).

1.5 Applicability. This specification is a stand-alone specification that is specific to I&C

equipment, and therefore, it is not necessary to refer to the base MIL-PRF-23199 specification. Previous revisions to MIL-PRF-23199 (i.e., MIL-P-23199) referenced levels A, B and C of packaging and packing. This specification eliminates these level designations; thus, any reference to these levels in contractual documents is not applicable. The entire specification should be assumed applicable unless otherwise noted in contractual documents.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, or 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, or 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in that issue cited in the solicitation or contract. Unless otherwise specified, later issue of the specifications and standards may be used at the option of the Seller.

STANDARDS

MILITARY

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-2041	Control of Detrimental Materials
MIL-STD-2073-1	Standard Practice for Military Packaging

SPECIFICATIONS

MILITARY

MIL-DTL-117	Bags Heat-Sealable
MIL-I-8835	Indicator, Humidity, Card, Chemically Impregnated
MIL-DTL-17361	Circuit Breakers, Air, Electric, Insulated Housing, (Shipboard Use), General Specification for
MIL-DTL-17587	Circuit Breakers, Low Voltage, Electric Power, Air, Open Frame, Removable Construction
MIL-DTL-24466	Polyethylene Bags, Sheet, and Tubing, Green
MIL-PRF-81705	Barrier Materials Flexible, Electrostatic-Free, Heat Sealable
MIL-DTL-81997	Pouches, Cushioned, Flexible, Electrostatic-Free Reclosable, Transparent

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents. The following other Government documents form a

part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

FEDERAL

A-A-3129	Cushioning Material, Flexible Open Cell Plastic Film (For Packaging Applications)
A-A-3174	Plastic Sheet, Polyolefin
A-A-59135	Packaging Material, Sheet
DOT-CFR-049	Federal Motor Vehicle Safety Standards
PPP-C-~~00~~795	Cushioning Material, Packaging (Flexible Closed Cell Plastic Film, For Long Distribution Cycles)
PPP-C-1797	Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam

2.3 Non-Government Publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

IPC ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES

IPC/JEDEC J-STD-033	Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

(Applications for copies should be addressed to the Institute for Interconnecting and Packaging Electronic Circuits, 2215 Sanders Road, Northbrook, IL 60062-6135.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 392	Standard Test Method for Flex Durability of Flexible Barrier Materials
ASTM F 1249	Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
ASTM D 3951	Standard Practice for Commercial Packaging
ASTM D6251 /D6251M	Standard Specification for Wood-Cleated Panelboard Boxes
ASTM D7478 /D 7478M	Standard Specification for Heavy Duty Sheathed Wood Crates

(Copies of these documents are available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or online at www.astm.org.)

3. PACKAGING, PACKING AND MARKING REQUIREMENTS

3.1 General Requirements

3.1.1 Materials

3.1.1.1 "Loose fill" cushioning: Use of "loose fill" cushioning is prohibited.

3.1.1.2 Fiberboard Boxes: The gross weight of a fiberboard box, including contents, shall not exceed the manufacturer's maximum gross weight described on the box. In no case shall the gross weight of a fiberboard box including contents exceed 200 pounds. Cleated panel boxes or palletized, skidded fiberboard boxes shall be used when the load is characterized by irregular shape not lending support to the container or by great density (e.g., large transformers). Boxes in accordance with ASTM D 6251, Type I or Type II, Class 1 or Class 2, Style A are acceptable.

3.1.1.3 Wooden Boxes: Wooden boxes for gross shipments under 200 pounds do not require skids. Component shipments in wooden boxes exceeding 200 pounds shall have skids suitable for fork lifting. Wooden boxes shall be girth strapped using rust resistant steel banding around the box in not less than two places. For skids, the girth straps shall be applied to and immediately adjoining the inner edge of each skid. For skid-type base boxes, wooden blocking shall be affixed to the base to prevent fork-lifting of loads from the ends. The blocking shall not extend beyond the sheathing envelope, shall be permanently attached, and shall not interfere with sling handling of the load. Wooden boxes, including contents, shall not exceed 800 pounds. Reinforced wooden box sketches that include the blocking, bracing and anchoring arrangement shall be provided in the Seller's procedure.

3.1.1.4 Wooden Crates: Components exceeding 800 pounds shall be packed in skid based wooden crates per the construction requirements of ASTM D 7478/D 7478M using material per 3.1.1.5. Wooden blocking shall be affixed to the base to prevent fork-lifting of loads from the ends. The blocking shall not extend beyond the sheathing envelope, shall be permanently attached, and shall not interfere with sling handling of the load. Reinforced wooden crate sketches that include the blocking, bracing and anchoring arrangement shall be provided in the Seller's PP&M procedure.

Unless otherwise specified by the ***GPA***, for items packed in accordance with 3.2.1.2, the front of the crate shall be fastened to the sides (ends) using a minimum number of quick release fasteners, lag bolts or deck screws. A minimum number of these types of fasteners shall also be used to fasten the bottom of the sides (ends) to the skid base. Except for attachment of the quick release fasteners, nails, staples, or other types of fasteners, shall not be used to secure the front of the crate to the sides (ends) of the crate, or the sides (ends) of the crate to the skid base.

3.1.1.5 Materials of construction. Wooden boxes and crates shall be enclosed and constructed using commercial quality lumber and/or plywood fabricated in a manner to adequately protect the component. Knots, knot holes, splits and moisture content shall not impair the integrity of the container and component. Commercial nails and/or other fasteners shall be of sufficient size, spacing and quantity to provide a construction that will adequately protect the component under normal handling during shipment. Nails and other fasteners shall be driven so that neither the head nor the point projects above and through the surface of the wood (except for the quick-release fasteners and lag bolt heads defined in par 3.1.1.4). Steel banding shall be rust resistant.

3.1.1.6 Envelopes for use with Detectors. Envelopes shall be pigmented green polyethylene film conforming to the following requirements:

(a) The polyethylene shall meet the detrimental material control limits in MIL-STD-2041 for mercury and leachable halides and sulfur. Polyethylene meeting the requirements of MIL-P-24466 is considered acceptable.
(b) The polyethylene shall be free from gels, holes and foreign material and have uniform texture.

(c) The polyethylene shall be capable of meeting the physical properties for Type II polyethylene as described in A-A-3174.
(d) Envelope size shall be kept to a minimum.
(e) Envelope nominal thickness shall be .006 inches (.004 inches minimum). Multiple layers may be used for component protection.

3.1.1.7 ESD Control: Items subject to damage by electromagnetic and electrostatic field forces shall be handled at an approved field force protective work station (ESD protected work station). The items being packaged shall be initially wrapped or cushioned, and then sealed in a unit bag utilizing the materials identified below. When required, the desiccant and humidity indicator shall be attached to the outside of the inner bag or wrap. Desiccant shall not come in contact with the item being packaged. Lead or terminal configurations for all items shall be protected and maintained as manufactured without causing loads or stresses capable of causing damage to the item. Materials used to maintain item position and lead or terminal configuration shall permit item removal without damage to the item. Electrostatic discharge (ESD) sensitive caution labels shall be applied in accordance with MIL-STD-129.

Process	Material to conform to
Initial Wrap or Cushioning	MIL-PRF-81705 Type I or Type III or A-A-59135 Class 2, Grade B or Grade D or A-A-3129 Grade B or PPP-C-795 Class 2 or Class 3, or PPP-C-1797 Type II or bags conforming to MIL-DTL-117, Type I, Type II, Type III or Type IV, Class F or Class H, Style 1,Style 2 or Style 3.
Unit Bag	MIL-DTL-117, Type I, Type II or Type IV, Class F, Style 1, Style 2 or Style 3.

Re-closable cushioned pouches conforming to MIL-P-81997 Type I or Type II may be used in lieu of an initial wrap or cushioning.

Only antistatic or conductive materials are allowed inside the unit pack ESD bag. ESD tape used inside the unit package bag shall contain an ESD symbol pattern. Connectors and plugs (power or signal) shall be covered with conductive caps, plugs or similar means.

3.1.1.8 Other Packaging Materials. At a minimum, other packaging materials shall be of good commercial quality and shall be capable of performing their intended function. Bag material shall be able to be heat sealed resulting in a water/vapor proof barrier and shall be of sufficient thickness to prevent puncture and tearing during handling and shipment. Cushioning materials, blocking and bracing shall be applied as required to protect the item and the enclosing media and restrict the movement of the item within the container.

3.1.1.9 Material for Plastic Encapsulated Microcircuit (PEM) Devices and Non-Hermetically Sealed Surface Mount Devices. For plastic encapsulated microcircuit devices and non-hermetically sealed surface mount devices, a moisture barrier bag (MBB) that meets MIL-PRF-81705 Type I requirements for flexibility, ESD protection, mechanical strength, and puncture resistance as described in IPC/JEDEC J-STD-033 is required. The bag shall be evacuated (hand or vacuum) free of air and heat-sealed. The water vapor transmission rate (WVTR) shall be in accordance with IPC/JEDEC J-STD-033. Humidity indicator cards and desiccant shall be placed inside MBBs per the requirements of IPC/JEDEC J-STD-033. The desiccant and humidity indicator shall be attached to the outside of the inner bag or wrap. The desiccant shall not come in contact with the item being packaged. The reels utilized for surface mount parts shall be made specifically for use in automated handling equipment and both the reels and trays shall be either the original reels and trays supplied by the component manufacturer or made of a conductive material.

3.1.2 Foreign Materials. All items packaged and packed and all packaging/packing medium shall be free from debris and other foreign materials.

3.2. Detailed Packaging, Packing and Marking Requirements

3.2.1 Cubicles, Panels and Equipment Enclosures

3.2.1.1 Packaging. Cubicles, Panels and Equipment Enclosures shall be packaged in a heat sealed, floating bag with desiccant and humidity indicators per the preservation requirements of MIL-STD-2073-1 Method 53. Materials shall be in accordance with 3.1.

3.2.1.2 Packing. Cubicles, Panels and Equipment Enclosures shall be packed in wooden crates (3.1.1.4) designed to be shipped and handled under cover and stored in warehouses or other structures affording equivalent protection from weather. The packing shall afford adequate protection during multiple reshipments. Commercial grade shock and tilt indicators which can detect and record rough handling or unacceptable tilting, and which provide a visual deterrent to improper handling of shipments, shall be affixed to the crate in such a manner as to provide for monitoring on all six axes (e.g., one indicator on the front and one on the adjacent side of the crate).

3.2.1.3 Marking. In addition to the marking requirements per 3.3, the following marking shall be provided:

3.2.1.3.1 Sheltered Building Marking. The outer container shall be marked on all four sides in red as follows:

STORAGE REQUIREMENTS: SHELTERED BUILDING
MINIMUM TEMPERATURE 40° F

3.2.1.3.2 Front Location Marking. The crate shall be marked to identify the location of the front of the cubicle, panel or equipment enclosure and any special handling instructions, e.g., "LIFT FROM THIS END ONLY". For asymmetrical, off-center loads, the preferred fork-lift opening shall be marked and all other sides shall be marked "DO NOT LIFT FROM THIS END". (See 3.1.1.3 or 3.1.1.4.)

3.2.1.3.3 Shock and Tilt Indicators. When shock and tilt indicators are used (see 3.2.1.2) the Seller shall add a note on the shipping crate adjacent to the indicator directing the Receiving

Facility to annotate the delivery receipt, and to contact the Seller and the ***GPA*** if the shipment is received with an indicator that identifies the possibility of damage during transit.

3.2.2 Drawers, Chassis

3.2.2.1 Packaging. Drawers and chassis shall be packaged in a heat sealed bag with desiccant and humidity indicators per the preservation requirements of MIL-STD-2073-1 Method 51 or Method 52. Materials shall be in accordance with 3.1. For drawers or chassis with ESD sensitive components mounted directly on the drawer or chassis (other than plug-in modules), the barrier shall be made from ESD protective material (3.1.1.7). For drawers containing plug-in modules containing ESD sensitive components, the barrier material shall be made from ESD protective material, or, as an alternative, a non-ESD protective barrier material may be used so long as the drawer connector(s) is covered with an ESD protective shipping cap, or other ESD protective material.

3.2.2.2 Packing. Drawers and chassis shall be individually packed in wooden boxes (3.1.1.3) designed to be shipped and handled under cover and stored in warehouses or other structures affording equivalent protection from weather. The packing shall afford adequate protection during multiple reshipments.

3.2.2.3 Marking. Marking shall be in accordance with 3.3.

3.2.3 Detectors (other than Neutron/Gamma Detectors)

3.2.3.1 Packaging. Detectors (other than Neutron/Gamma Detectors) shall be packaged in a heat sealed green polyethylene bag (3.1.1.6) with desiccant and humidity indicators per the preservation requirements of MIL-STD-2073-1 Method 51. Materials shall be in accordance with 3.1.

3.2.3.2 Packing. Detectors shall be individually packed in wooden boxes (3.1.1.3) designed to be shipped and handled under cover and stored in warehouses or other structures affording equivalent protection from weather. The packing shall afford adequate protection during multiple reshipments.

3.2.3.3 Marking. Marking shall be in accordance with 3.3.

3.2.3.4 Additional Requirements for Primary Plant Detectors. For detectors intended to be in contact with primary plant fluid, contract cleanliness requirements shall apply through all steps of packaging and handling. In addition, the green polyethylene bag shall be purged with dry inert gas (nitrogen or argon) having a dew point of minus 40 degrees Fahrenheit or lower prior to sealing.

3.2.3.5 Calibration Data Sheets. When calibration data sheets are required, three copies of the data sheets shall be placed in a heat sealed waterproof envelope and packaged with the detector. The data envelope shall be labeled with its contents, and the detector standard identifier (SI) and serial number. Additionally, the data envelope shall be labeled:

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DATA SHEETS
REQUIRED FOR DETECTOR INSTALLATION
STORE WITH THE DETECTOR

DO NOT DISCARD
****

3.2.4 Neutron and Gamma Detectors.

3.2.4.1 Packaging.

3.2.4.1.1 Each Neutron Detector shall be packaged per the preservation requirements of MIL-STD-2073-1 Method 51. The detector shall be placed in a green polyethylene bag (3.1.1.6) with desiccant and humidity indicators. A second bag made from water/vapor proof material shall be heat sealed around the first, green polyethylene bag. The water/vapor proof bag shall be purged with dry inert gas (nitrogen or argon) having a dew point of minus 40 degrees Fahrenheit or lower prior to sealing. Materials shall be in accordance with 3.1.

3.2.4.1.2 Each Gamma Detector shall be packaged in a heat sealed green polyethylene bag (3.1.1.6) with desiccant and humidity indicators per the preservation requirements of MIL-STD-2073-1 Method 51. The green polyethylene bag shall be purged with dry inert gas (nitrogen or argon) having a dew point of minus 40 degrees Fahrenheit or lower prior to sealing. A second bag made from water/vapor proof material shall be heat sealed around the first green polyethylene bag. Materials shall be in accordance with 3.1.

3.2.4.2 Packing. Each detector shall be packed in a wooden box (3.1.1.3) designed to be shipped and handled under cover and stored in warehouses or other structures affording equivalent protection from weather. The packing shall afford adequate protection during multiple reshipments.

3.2.4.3 Marking. In addition to any special labeling or marking required by the Department of Transportation (DOT) and the marking requirements identified in 3.3, the following requirements apply:

3.2.4.3.1 The shipping container for each detector shall be marked "Fragile"

3.2.4.3.2 Irradiated (operated or tested in a reactor facility) or radioactively contaminated detectors to be shipped to a ***GPA*** program facility shall be marked and labeled in accordance with applicable regulations.

3.2.4.4 Shipping Caps. Each detector connector shall have a weatherproof coaxial connector protective cap to prevent damage to the connector threads and degradation to the connector insulation resistance.

3.2.4.5 Integral Cable. The detector's integral cable shall be coiled and held together with twisted wire ties or other suitable methods.

3.2.4.6 Information furnished with Neutron Detectors. A copy of the signed acceptance test data sheet with the serial number, and measured sensitivity value shall be transmitted in a heat sealed waterproof envelope with each compensated ion chamber.

3.2.5 Special Tools. Special tools, which are not required to be installed in the equipment, shall be separately packaged and packed as Spare Components (3.2.7).

3.2.6 Miscellaneous Items. Miscellaneous items such as connectors, meters, resistors,

capacitors, magnetic components, switches, microcircuits, semiconductors, sheet metal items, hardware, etc. shall be packaged and packed in accordance with the requirements for Spare Components (3.2.7). In addition, large transformers and similar types of items where the load is characterized by irregular shape or great density shall be packed in accordance with the requirements of 3.1.1.2, 3.1.1.3 or 3.1.1.4, as applicable.

3.2.6.1 Printed Wiring Assemblies (PWA), Electronic Assemblies, Circuit Card Assemblies (CCA) and Electronic Module Assemblies (other than Drawers or Chassis covered by 3.2.2) PWA ESD control requirements are defined in 3.1.1.7 and MIL-STD-2073-1. PWA Moisture protection requirements are defined in 3.2.7.1.6. PWA ESD handling requirements are defined in 3.2.7.1.4.4. Figure 1 and Figure 2 show typical PP&M arrangements for these types of equipment.

3.2.6.1.1 Packaging - Each assembly or module shall be individually unit packaged in a heat sealed bag with desiccant and humidity indicators per the preservation requirements of MIL-STD-2073-1 Method 51 or Method 52.

3.2.6.1.2 Packing - Each assembly shall be unit packed. The packing shall afford adequate protection during multiple reshipments. The unit pack (i.e., outside container) shall meet the requirements of 3.1.1.2 or 3.1.1.3 as applicable.

3.2.6.1.3 Marking - Unit package marking is only required on the outer bag. In addition to marking requirements specified in 3.3, the unit packaging shall be marked "DESICCATED PACKAGE - DO NOT OPEN UNTIL READY FOR USE".

3.2.6.2 Surface Mount Devices (SMD) – Trays and Reels ESD control requirements and material requirements are defined in 3.1.1.7 and 3.1.1.9. Moisture protection requirements are defined in 3.1.1.9 and 3.2.7.1.6. ESD handling requirements are defined in 3.2.7.1.4.4. The time that components are exposed to the air shall be kept to a minimum and shall be in accordance with IPC/JEDEC J-STD-033.

3.2.6.2.1 Packaging - Each tray or reel of components shall be individually unit packaged in a heat sealed bag (see 3.1.1.9) with desiccant and humidity indicators per the preservation requirements of IPC/JEDEC J-STD-033. Surface mount devices that are provided by the component manufacturer in trays or on reels shall remain packaged in the trays or on the reels provided by the component manufacturer unless otherwise specified by the ***GPA***.

3.2.6.2.2 Packing - Each package shall be unit packed. The packing shall afford adequate protection during multiple reshipments. The unit pack (i.e., outside container) shall meet the requirements of 3.1.1.2.

3.2.6.2.3 Marking - Marking shall be in accordance with 3.3 except that both the unit package (bag) and unit pack (box) shall be identically labeled and shall be marked "DESICCATED PACKAGE - DO NOT OPEN UNTIL READY FOR USE". The quantity and unit measure shall read "1 Lot". The description shall include the part nomenclature and in parentheses the quantity of parts per tray/reel. (e.g., "Microcircuits (24 pieces per tray)" or "Microcircuits (100 pieces per reel)")

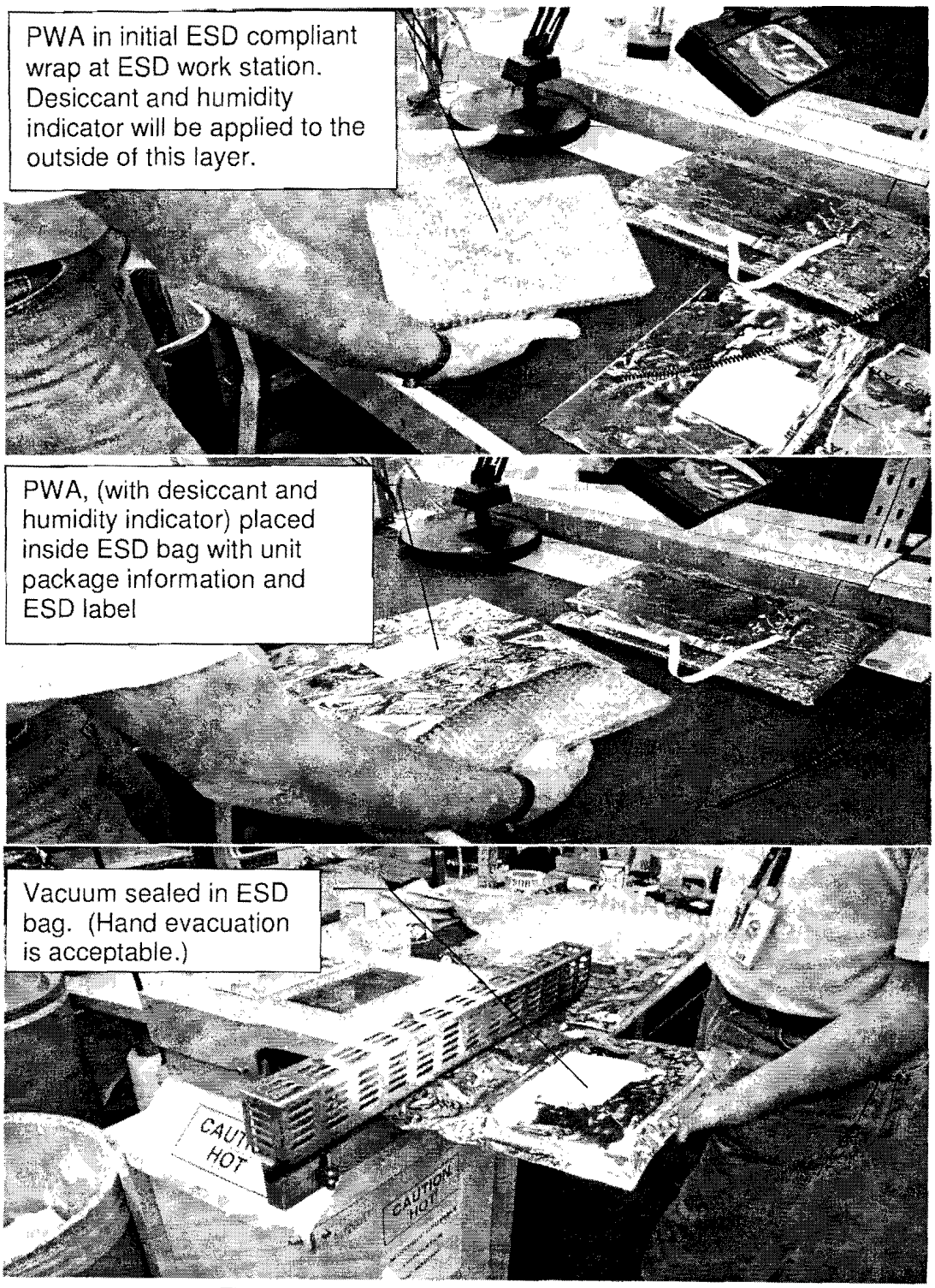

Figure 1: Typical PP&M Sequence for a PWA or CCA

(Figure 1 – Page 1 of 2)

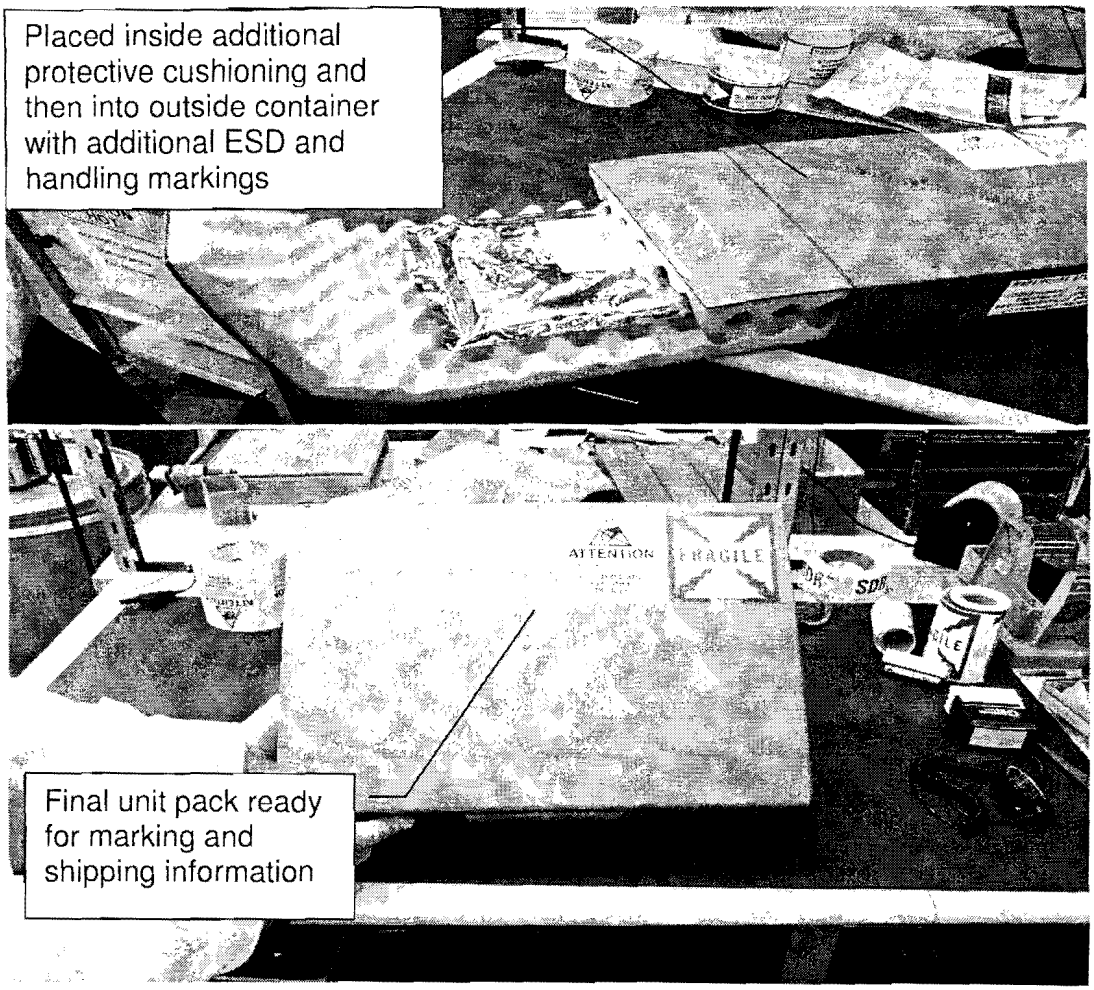

Figure 1: Typical PP&M Sequence for a PWA or CCA
(Figure 1 – Page 2 of 2)

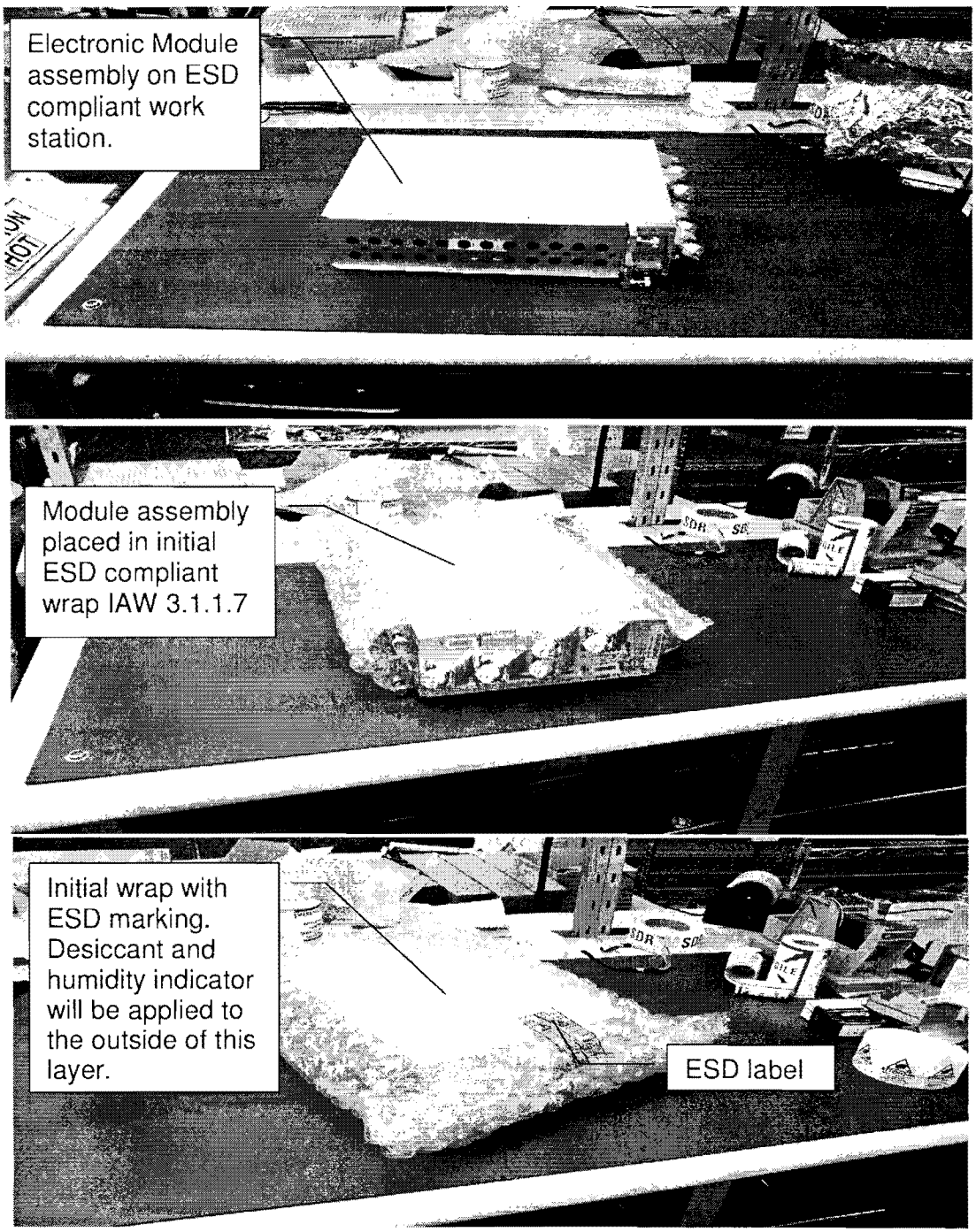

Figure 2: Typical PP&M Sequence for an I&C Electronic Module Assembly
(Figure 2 – Page 1 of 3)

Figure 2: Typical PP&M Sequence for an I&C Electronic Module Assembly
(Figure 2 – Page 2 of 3)

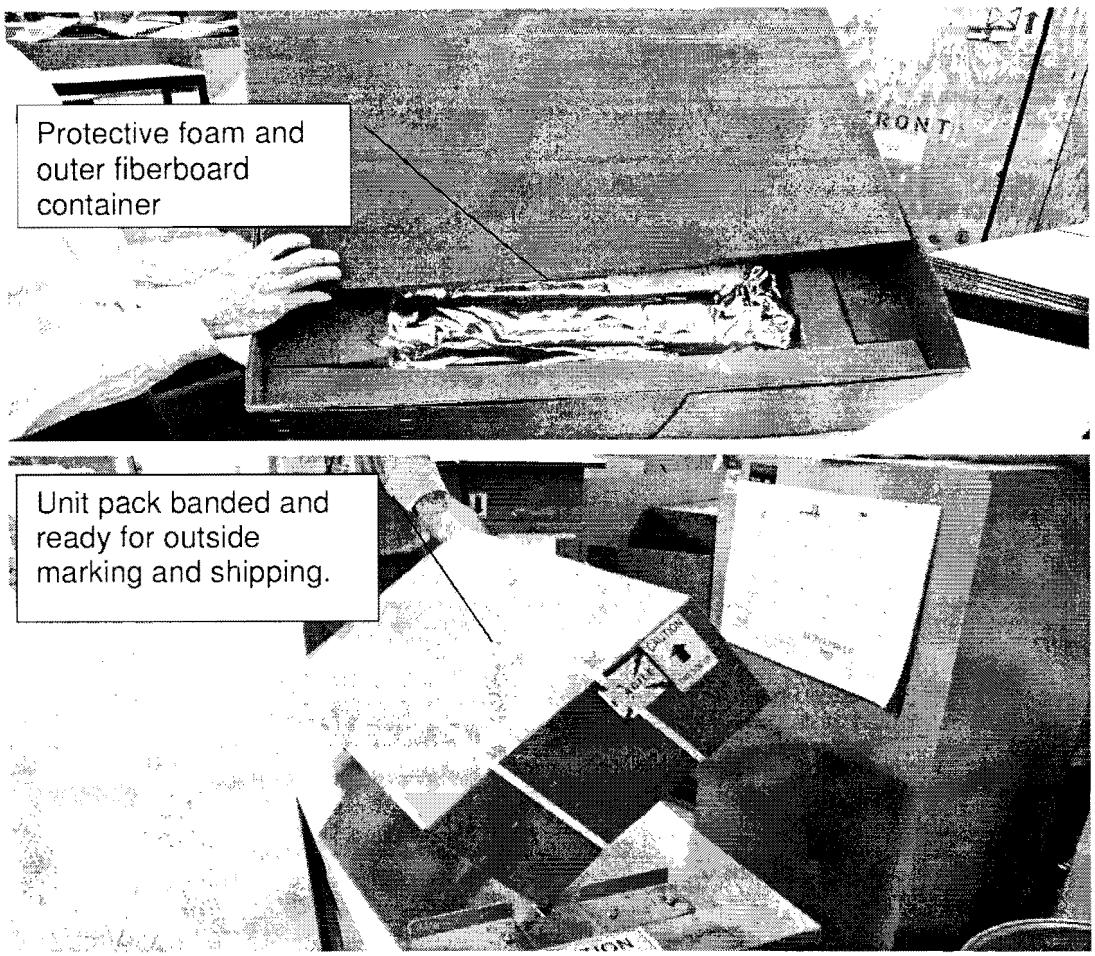

Figure 2: Typical PP&M Sequence for an I&C Electronic Module Assembly
(Figure 2 – Page 3 of 3)

3.2.6.2.4 Over-Packing and Marking – When directed by the ***GPA***, the unit pack boxes going to the same destination shall be over-packed into an outer container meeting the requirements of 3.1.1.2 or 3.1.1.3 and marked in accordance with 3.3.3. The number of unit pack boxes packaged into each over-pack container shall be in accordance with the ***GPA*** provided shipping paperwork (DD 250 or DD 1149).

3.2.7 Spare Components. Spares including On-Board Repair Parts (OBRP), Shipyard Load Lists (SLL) Items, Initial Navy Supply System Repair Parts (INSSRP), items bought to individual repair part ordering data (IRPOD) and field change (F/C) kit material shall be packaged, packed and marked as follows. ESD control requirements are defined in 3.1.1.7. ESD handling requirements are defined in 3.2.7.1.4.4. Moisture protection requirements are defined in 3.2.7.1.6 or 3.1.1.9.

3.2.7.1 Unit Packaging Quantity Unless otherwise specified by the ***GPA***, all items shall be individually unit packaged. Each unit package shall conform and be labeled to requirements

noted elsewhere in this specification. A unit is defined to be a single item, set, box, kit, assembly or as specified by the ***GPA***. For surface mount components, each reel or tray shall be considered a single unit (see 3.2.6.2). All items included in a set/kit of OBRP, INS, INSSRP or SLL shall be individually unit packaged.

3.2.7.1.1 Bags. Bag size should be kept to a minimum. Prior to sealing the bag, excess atmosphere shall be expelled by reducing the bag to its smallest volume practical without damage to the component. Bag materials shall meet the requirements of 3.1.1.7, 3.1.1.8 and/or 3.1.1.9 as applicable. Bag size is based on the inside dimensions.

3.2.7.1.2 Parts/assemblies under 6.0" in length, width or depth. This bag should be a standard 3"x3" bag (or smaller) whenever possible. The size of the bag should not exceed 2" in height or width greater than the part/assembly after the part/assembly has been placed inside the bag. However, to allow space for label information for bags containing very small parts, the packager/Seller is not required to utilize a bag smaller than 3" in height or 3" in width. The Seller may increase the bag size due to ***GPA***/Government supplied labels as specified in 3.2.9.3 below.

3.2.7.1.2.1 Resealing Requirements For sealed unit pack bags containing parts or assemblies less than 6" in length, width or depth, the bag shall permit opening and resealing once. All other bags shall permit opening and resealing two times. The intent is to provide sufficient material so that the bag may be opened by cutting off the portion that is sealed and then resealed using a heat sealer.

3.2.7.1.3 Parts/assemblies greater or equal to 6.0" in length, width or depth. The size of the bag should not exceed 4" in height or width greater than the part/assembly size after the part/assembly has been placed inside the bag. The bag shall permit opening and resealing two times. The intent is to provide sufficient material so that the bag may be opened by cutting off the portion that is sealed and then resealed using a heat sealer.

3.2.7.1.4 Cushioning & Protection

3.2.7.1.4.1 Unit-pack containers (tubes, vials, fastpacks, boxes, totes, etc.) The use of unit pack containers for unit packaging is permitted provided it provides packaging that is simpler, less costly, and complies with the requirements stated herein.

3.2.7.1.4.2 Cushioning Material Thickness. The cushioning for the protection of the leads and terminals shall be sufficient enough to prevent physical damage and maintain leads and terminals in the manufactured condition under handling and transportation environments.

3.2.7.1.4.3 ESD Cushioning. For ESD sensitive multi-pin electronic devices, the cushioning material shall be high-density conductive foam.

3.2.7.1.4.4 ESD Handling. All ESD sensitive components shall be handled and packaged only at a field force protected workstation. For packaging purposes, all microcircuits, and any part marked by the part manufacturer with one or more triangles to identify the part is static sensitive, are considered to be ESD sensitive electronic devices.

3.2.7.1.5 Cushioning/Protection (other than as discussed in 3.2.7.1.4) Deleted

3.2.7.1.6 Protection From Moisture Barrier material per 3.1.1.7 shall be used. The required desiccant and humidity indicator shall be attached to the outside of the inner bag or wrap.

The desiccant shall not come in contact with the item being packaged. The reseal requirements identified elsewhere in this specification apply to the unit package bag. Unit package marking is only required on the outer bag. In addition to marking requirements specified elsewhere in this specification, the unit packaging shall be marked "DESICCATED PACKAGE - DO NOT OPEN UNTIL READY FOR USE".

Barrier bag material for all plastic encapsulated microcircuits (PEMs) and non-hermetically sealed surface mount devices shall be in accordance with 3.1.1.9.

3.2.7.2 Unit Pack Spare components shall be individually packed unless the provisions of 3.2.10 apply.

3.2.7.3 Marking See 3.2.9, 3.2.10 and 3.3.1.

3.2.8 Circuit Breaker and Solid State Interrupter (SSI) Packaging, Packing and Marking

3.2.8.1 Circuit Breakers Packaging of Circuit Breakers shall be as specified in the Circuit Breaker Military Specification (MIL-DTL-17361 (SH) for AQB type and MIL-DTL-17587(SH) for ACB type circuit breakers).

3.2.8.2 SSI. Packaging SSIs shall be based on weight in accordance with the following:

Weight	Package as
Less than 75 pounds	Drawers, Chassis (3.2.2)
75 pounds or more	Cabinets, Panels (3.2.1)

3.2.9 Unit Pack Labels

3.2.9.1 Warranty markings Warranty markings are not required on sealed unit pack bags.

3.2.9.2 Marking Size and Font. The marking size and font, including bar code density, shall be determined such that the label/marking requirements will not increase the package size. Except as noted in 3.2.9.3, the package size shall be determined per 3.2.7.1.2 and not by the label/marking size. All markings must meet the requirements of MIL-STD-129.

3.2.9.3 GPA/Government Supplied Labels. Labels fabricated by the packager/Seller shall conform to 3.2.9.2 above. Any label, supplied by the ***GPA*** or a Government agency, which exceeds the size of the bag (as specified in 3.2.7.1.2) may be trimmed and/or folded over both sides of the bag provided the label remains legible and bar codes are not folded. Should the packager/Seller be unable to fold and trim the label to meet the requirements of 3.2.7.1.2, then a larger bag may be used. In this case, the bag size shall be determined based on the size of the folded and trimmed label and the part size.

3.2.10 Field Change Kits

3.2.10.1 Packaging Items being furnished as part of a field change kit shall be packaged in accordance with the applicable requirements specified herein, for the type of item being shipped (e.g., 3.2.2 for drawers, chassis; 3.2.6 for miscellaneous items; 3.2.7 for spare components, etc.). Packaging instructions provided by the ***GPA*** take precedence over the requirements stated herein.
Similar items shall be packaged as a lot provided that the lot size does not exceed the number of

parts required to modify one assembly. For example, if four identical screws are required to modify a given drawer and there are two drawers per ship, then the field change kit should allow four screws per bag. Spare items shall be packaged to allow for shipment separate from the installed items.

3.2.10.2 Packing Items being furnished as part of a field change kit shall be packed in accordance with the applicable requirements specified herein, for the type of item being shipped (e.g., 3.2.2 for drawers, chassis; 3.2.6 for miscellaneous items; 3.2.7 for spare components, etc.).

If the ***GPA*** has contracted for the Seller to install the field change kit and long-term storage is not involved, all items (except for spare parts) may be over-packed in one or more wooden or fiberboard boxes per the applicable requirements herein. Alternate methods of over-packing will be considered and authorized by the ***GPA*** on a case by case basis. (For example, over packing PWAs in plastic cases or combining the entire unit packaged material in aluminum or wood shipping crates.) Spare parts shall be packed in a separate container in accordance with 3.2.7.

3.2.10.3 Marking Marking shall be in accordance with 3.3.

3.2.11 Heat Exchangers, Cold Plates & Other Similar Items Heat exchangers, cold plates and other similar designed items, that are being shipped as spare components, shall be PP&M the same as for drawers or chassis (3.2.2). Each item shall be packed in a separate wooden box. A wooden box is not required for modular electronic equipment with integral heat sinks (e.g., the Generic I&C power supply assemblies); these items are covered by 3.2.6.1.

Prior to packaging, each item shall be purged free of water using clean, dry shop air. Subsequently, the inlet and outlet ports shall be capped with a suitable cap (of a commercial material that is not detrimental to the part being capped and is not PVC) to preclude the entrance of moisture or foreign material. The caps/plugs shall be designed such that they cannot be inadvertently pushed into the piping ports. This requirement also applies to items that are being shipped installed in a cabinet, enclosure or panel.

Appropriate cushioning material/support shall be provided to preclude damage, bending, deforming, or otherwise causing a dimensional change to the orientation of the inlet port, outlet port, piping and heat exchanger fins. This requirement also applies to items that are being shipped installed in a cabinet, enclosure or panel.

Desiccants and humidity cards are not required.

A label shall be provided with each unit package that contains the following marking, or equivalent:

CAUTION
DO NOT REMOVE CAPS FROM THE PIPING INLET AND OUTLET PORTS EXCEPT FOR INSPECTION OR INSTALLATION. CAPS MUST BE REMOVED PRIOR TO INSTALLATION.

This label shall also be provided on the final pack for items installed in a cabinet, enclosure or panel.

3.3 Marking Requirements
All markings must meet the requirements of MIL-STD-129.

3.3.1 Unit Pack Marking

3.3.1.1 Minimum Label Information. The following minimum information to be printed on the label shall include:

Bar Code Marking
National Stock Number
Description
Drawing/Piece Number, MIL Designation or Catalog Number
Quantity and Unit of Measure
Purchase Order Number
Supplier Name or CAGE Code
Equipment Line Item Number (ELIN) when supplied by the ***GPA***

In addition to the above markings, all labels for ESD sensitive components shall be marked with the standard ESD symbol per MIL-STD-129 and the statement "DO NOT OPEN EXCEPT AT APPROVED FIELD FORCE PROTECTIVE WORK STATION". The minimum size of the symbol shall be one third of an inch measured vertically. The historical ESD symbol (three arrows in a circle) should no longer be used.

3.3.1.2 Shelf Life Marking. When the item being shipped has a finite shelf life (e.g., 60 months or less), insert the additional information: (This requirement applies to the end item and not to elastomers installed in components.)

a. Type I Shelf Life Item
b. Cure Date (Seller to insert cure date if an elastometer)
c. Expires (Seller to insert shelf life expiration date)
d. To be disposed of upon expiration

NOTE: Elastomers with a shelf life between 5 and 19 years must be marked with a shelf life of 5 years. Elastomers with a shelf life of 20 years or greater must be marked "Cure Date___. Do not use 20 years beyond cure date."

3.3.2 Intermediate Packing and Marking. Intermediate packing for field change kit material shall be in accordance with 3.2.10 and as specified in the field change ordering data. Individually packaged components may be over packed in a temporary shipping container for transportation to the destination.

3.3.3 Outer Container Marking. Exterior markings shall contain only that information specified in 3.3.3.1-4, 6-10, 15 and 16 (Mandatory) and 3.3.3.5, 11-14 and 17 (as appropriate) below. Markings on exterior containers shall not reference any: (1) Project, (2) Equipment Specification, or (3) Number of Installed Components

3.3.3.1 Name and Address of Seller

3.3.3.2 Include the complete destination address as provided by ***GPA*** and note "For APA Stock", "On-Board-Spares", "Shipyard Installation Tools", "Tender Load List", or Tender Allowance List" if applicable. Include hull number. The specific destination will be furnished by the ***GPA*** prior to shipment.

3.3.3.3 Item description(s), including National Stock Numbers (NSN) with Bar Code marking. When shipments include components intended for both installation and on-board spares, the item descriptions should delineate the quantities intended for each use.

3.3.3.4 Standard Identifier and Serial Number as provided by the ***GPA***. The Serial Number must match exactly the serial number marked on the equipment nameplate and shipping document.

3.3.3.5 Equipment Line Item Number (ELIN), when supplied by the ***GPA***

3.3.3.6 Purchase Order Number

3.3.3.7 Government or Commercial Bill of Lading Number/TCN Number/Registered Number/Way Bill Number

3.3.3.8 Gross weight and cube of the parcel as shipped

3.3.3.9 Boxes containing field change kits shall be identified with the following external markings:

ShipAlt Number_____	Note (a)
Field Change Number_____	Note (b)
OBRP Are/Are Not Enclosed	Note (c)
Box ___ of ___	Note (d)
TCN/Reg. No./GBL Way Bill No._____	Note (e)
Ship Hull Number_____	Note (f)

Notes:

(a) To be supplied from the ***GPA*** if available. If not available, mark "Not Available" or "Later" as directed by ***GPA***

(b) To be supplied by ***GPA***. Do NOT include project identifier (i.e, S6W)

(c) Mark one way or the other. OBRP, if required to support the field change, shall be packaged separately and marked (OBRP Field Change____/ShipAlt No.____) identified on the DD-250/DD-1149 by PVR line item and included in the field change box, unless specifically directed by ***GPA***.

(d) Mark each box "1 of 3", "2 of 3", "3 of 3" etc. If shipment is made from a single box, mark it 1 of 1". Only complete kits shall be shipped unless ***GPA*** specifically authorizes shipments of partial kits; in such cases, ***GPA*** may provide additional marking instructions to suitably indicate the shortage.

(e) Enter data as applicable to the shipment

(f) To be supplied from the ***GPA*** if available. If not available, mark "Not Available" or "Later" as directed by ***GPA***

3.3.3.10 Precautionary note or label (must be in red): "Government-Furnished Equipment - Open per Requirements of Cognizant Government Inspector"

3.3.3.11 Precautionary note or label (must be in red): "Warehouse Storage Only"

3.3.3.12 For primary plant detectors, the container or unpacked item shall bear the precaution note (must be in red): "Do Not Open Seal Closures Except in Clean Area"

3.3.3.13 If arrows are required to indicate the desired position of the container during shipment and storage, place an arrow and the word "UP" on all four sides of the container.

3.3.3.14 If applicable, mark "FORKLIFT HERE"

3.3.3.15 Two copies of the DD Form 250/DD Form 1149 shall be placed in a waterproof envelope labeled "Packing List" attached to the outside of each container. In addition, one copy of the DD Form 250/DD Form 1149 shall be placed in a waterproof envelope attached to the inside of the container.

When Government inspection is required, the Government inspector may elect to sign only the shipping forms that are attached to the outside of each container. If this option is chosen, the Seller shall add a note to the Form provided inside the container that indicates that Forms signed by the Government inspector are included in the envelope attached to the outside of the container.

3.3.3.16 Mark the center of balance as required by MIL-STD-129 and 3.2.1.3.2 herein.

3.3.3.17 If the shipment consists of one box, mark it "1" of 1". If multiple boxes are involved, each box shall be marked "1 of 5", "2 of 5", etc.

3.4 Additional Requirements Applicable to Items that are assigned 2S/X1 National Stock Numbers

For all 2S/X1 components, the unit pack and exterior container must be one and the same (i.e., each 2S/X1 component must be individually packaged for shipment). Individually packaged components may be over packed in a temporary shipping container for transportation to the destination. The over pack container shall not be marked with the *GPA* provided bar coded labels. Over pack markings shall be in accordance with MIL-STD-129.

In conjunction with providing shipping destinations and applicable shipping documents, the ***GPA*** will supply for Seller use two (2) bar coded labels for each component that is assigned a 2S/X1 NSN. The Seller shall affix one of these labels immediately above the exterior markings required above. The second ***GPA*** furnished label shall be affixed completely opposite of the first (i.e., if the first label is on the front upper left, the second label is on back panel lower right).

When tags are used to meet the requirements for exterior markings the tags must be made of plastic in accordance with MIL-STD-129 and the bar coded labels shall be applied to the front (preferred) or reverse side of such tags.

3.5 Requirements for Classified Shipments. Classified shipments shall be in accordance with the National Industrial Security Program Operating Manual (NISPOM). Additional classified hardware markings shall be as specified in the latest revision of the Contract Security Classification Specification and its attachments.

3.6 Exclusive use of Truck When shipment by "exclusive use of truck" is specified by the ***GPA***, the expectation is that the trailer and the tractor (including the dromedary, if applicable) shall contain only those items that have been authorized for shipment by the ***GPA***. Tandem trailers are also not allowed, except for shipment of items authorized by the ***GPA***.

3.7 Explosives and Other Hazardous Materials No equipment shall be shipped in any transportation vehicle that contains explosive or hazardous materials (except for those materials specifically authorized by the ***GPA***).

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of inspection requirements as follows. If PP&M is performed at a packaging supplier and the equipment is to be drop shipped from the packaging supplier, the Seller shall perform periodic audits and over checks to determine compliance with this specification and the applicable PP&M procedure.

(a) PP&M shall be visually inspected as necessary to determine compliance with this specification. Sample inspection per the Seller's sample inspection procedure is acceptable.

(b) The shipping vehicle shall be visually inspected when the shipment exceeds 1,000 pounds. Shipping vehicles with unsatisfactory conditions shall not be used. All truck shipments shall have a driver vehicle inspection report in accordance with DOT CFR Title 49, Chapter III, Part 396.11. The items to be checked on the loaded vehicle prior to release shall be identified in the supplier's loading and blocking procedure (see 1.4.1) or the packaging, packing, and shipping procedure when the shipment exceeds 1,000 pounds. As a minimum, the loaded truck shall be inspected for (1) load shored and tied down as needed, (2) weight properly distributed and not overloaded, and (3) tailgates and doors closed, and all equipment secured.

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