



## Packing and Unpacking ESD Sensitive Hardware (QAP 61.12), Rev. 0

**OFFICIAL**  
Procedure

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### 1.0 Who Must Comply With This Procedure

This procedure applies to JPL personnel who handle unprotected electrostatic discharge sensitive (ESDS) hardware during packing and unpacking operations for movement out of or into an ESD controlled area, and while it is handled out of the area.

This procedure also applies to vendors supplying ESDS hardware to JPL.

This procedure also applies to JPL personnel who handle 'legacy' ESDS hardware that uses inherited containers that are neither conductive nor static dissipative.

The following cautions must be followed during handling of ESDS hardware:

**CAUTION:** *Unprotected ESDS hardware must only be handled in an ESD protected work area. The work area and personnel must be certified to the requirements of JPL Standard for Electrostatic Discharge (ESD) Control (D-1348), (JPL Rules DocID 34906).*

**CAUTION:** *Unprotected ESDS hardware must be neutralized prior to insertion into packaging material.*

**CAUTION:** *Packaging material must be neutralized prior to insertion or removal of ESDS hardware.*

**CAUTION:** *Only approved packaging and sealing material may be used for ESDS hardware.*

**CAUTION:** *ESDS hardware that is not received in static shielding packaging material, or is received in shipping containers that do not display appropriate ESD warning labels must be assumed to be damaged. Handle as non-conforming product per QAP 144.2.*

**CAUTION:** *Do not use Kapton™ tape for packaging.*

### 2.0 Packing

Actor	Action
All personnel who prepare unprotected	2.1 Neutralize packaging material prior to use and verify with an Electrostatic Field Meter or Static Locator that no charge greater than

ESDS hardware for removal from ESD controlled area

$\pm 200$  volts exists. Packaging materials can be neutralized by placing them on the grounded static dissipative work surface, grounding them with a ground wire, or exposing to the airflow from an air ionizer.

**Note:** Use only packaging materials approved to the requirements of JPL D-1348. Such approved packaging materials includes, in the order of their preference for use:

1. Static shielding bags or sheet stock,
2. Carbon filled, molded plastic boxes, or
3. Carbon coated corrugated cardboard boxes.

For part numbers and vendors, refer to the ESD approved material list on the JPL QA ESD website: <http://eis.jpl.nasa.gov/qa/esd/>

2.2 Neutralize ESDS items prior to packing. Neutralize the ESDS hardware by placing it on the grounded static dissipative work surface, attaching a ground wire, or exposing the item to the airflow from a calibrated, bipolar air ionizer.

2.3 Pack the ESDS hardware as shown in Figure 2-1. This Figure illustrates the minimum required container system for enclosing ESDS items for movement out of the ESD protected area. Place the ESDS item in the approved packaging material and seal the packaging material.

**Note:** Acceptable sealing methods include closing and securing the lid on boxes. For static shielding bags and sheet material, seal using tape or heat seal. Acceptable tapes include, in the order of preference:

1. 3M Corp. aluminum or copper metal foil tape
2. Wescorp static shielding tape.

**CAUTION:** Do not use Kapton™ tape for packaging.

For part numbers and vendors, refer to the ESD approved material list on the JPL QA ESD website: <http://eis.jpl.nasa.gov/qa/esd/>

	<p>2.4 Place the now protected ESDS hardware in a shipping container case prepared to conform to the requirements of JPL D-1348.</p> <p>2.5 Apply appropriate ESD warning labels to the packaging material and shipping container, as specified by JPL D-1348.</p>
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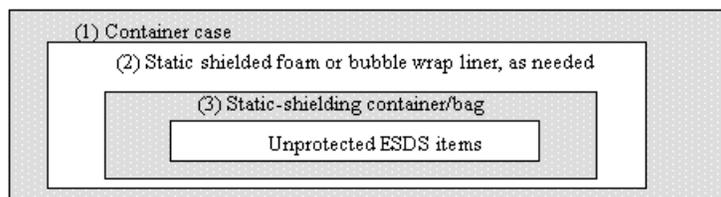


Figure 2-1. Minimum Required ESDS Hardware Container System

The container shall provide:

- An outer shell that provides adequate mechanical protection for the contents.
- Foam or bubble wrap shock absorbing liners that have static shielding covers.
- The unprotected ESDS item must be packaged in an approved static shielding container.

### 3.0 Unpacking

Actor	Action
All personnel who unpack ESDS hardware for removal to an ESD controlled area.	<p>3.1 Verify that appropriate ESD warning labels are on the outside of the shipping container, as specified by <a href="#">JPL Standard for Electrostatic Discharge (ESD) Control (D-1348)</a>, (JPL Rules DocID 34906). If not, refer to Section 4.0.</p> <p>3.2 Inspect the exterior of the shipping container case for charge using an electrostatic field meter or static locator.</p> <p>3.3 If the container case is charged to greater than <math>\pm 200</math> volts at any measurement point, it must be neutralized. Neutralize the container by placing it on a grounded static dissipative work surface, attaching ground wire, or exposing the item to the airflow from an air ionizer. Acceptable air ionizers include both radioactive air ionizers and bipolar, corona discharge air ionizers. Radioactive air ionizers are inherently self-balancing and do not require calibration.</p>

However, their effectiveness diminishes with time. Bipolar, corona discharge air ionizers are not inherently self-balancing and must be calibrated prior to use or once every six months.

3.4 Open the shipping container. After opening, re-inspect the shipping container case and contents for charge using an electrostatic field meter or static locator per Step 3.3, and neutralize if necessary.

3.5 Inspect the packing of the hardware. If the hardware is improperly packaged, improperly labeled, or otherwise unprotected, process the hardware per Section 4.0.

3.6 Remove the protected hardware from the shipping container, move the hardware to the ESD controlled area, and place on an approved ESD workstation.

3.7 Verify that the exterior of the packaging material is neutral using an electrostatic field meter or static locator. If the exterior of the packaging material is not neutralized, ground the packaging material through the body of a grounded worker, connect a ground wire or use air ionization to neutralize the packaging material.

3.8 Remove the packaging material from the ESDS hardware.

*Note: Removal of the ESDS hardware from its static shielding packaging material returns the ESDS hardware to the unprotected state.*

## 4.0 Discrepant Material

Actor	Action
JPL personnel who receive vendor supplied ESDS hardware.	<p>4.1 Assume ESDS hardware is damaged if it is received without being packaged in static shielding packaging material or shipping containers that do not display appropriate ESD warning labels. <a href="#">JPL Standard for Electrostatic Discharge (ESD) Control (D-1348)</a>, (JPL Rules DocID 34906) requires that such hardware be labeled as discrepant material. QA Receiving Inspection must generate an IR discrepancy for non-conforming product.</p> <p>In this case, handle the hardware in conformance with QAP 144.2, <a href="#">Control of Non-Conforming Product</a> (JPL Rules! DocID 36795).</p> <p><b>CAUTION:</b> <i>ESDS materials received unlabelled or improperly packaged must not be used in mission critical applications. Mission critical hardware includes all flight hardware, ground support equipment, deep space network and engineering models.</i></p>

## 5.0 Controlled Records

The IR and all attached documentation for non-conforming product are ‘project records’ in the project’s PDMS space. Unattached data referenced in the IR are ‘project records’ related to the IR, in the repository referenced in the IR.

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*Paper copies of this document may not be current and should not be relied on for official purposes. The current version is in the JPL Rules! Information System at <http://rules/>*

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